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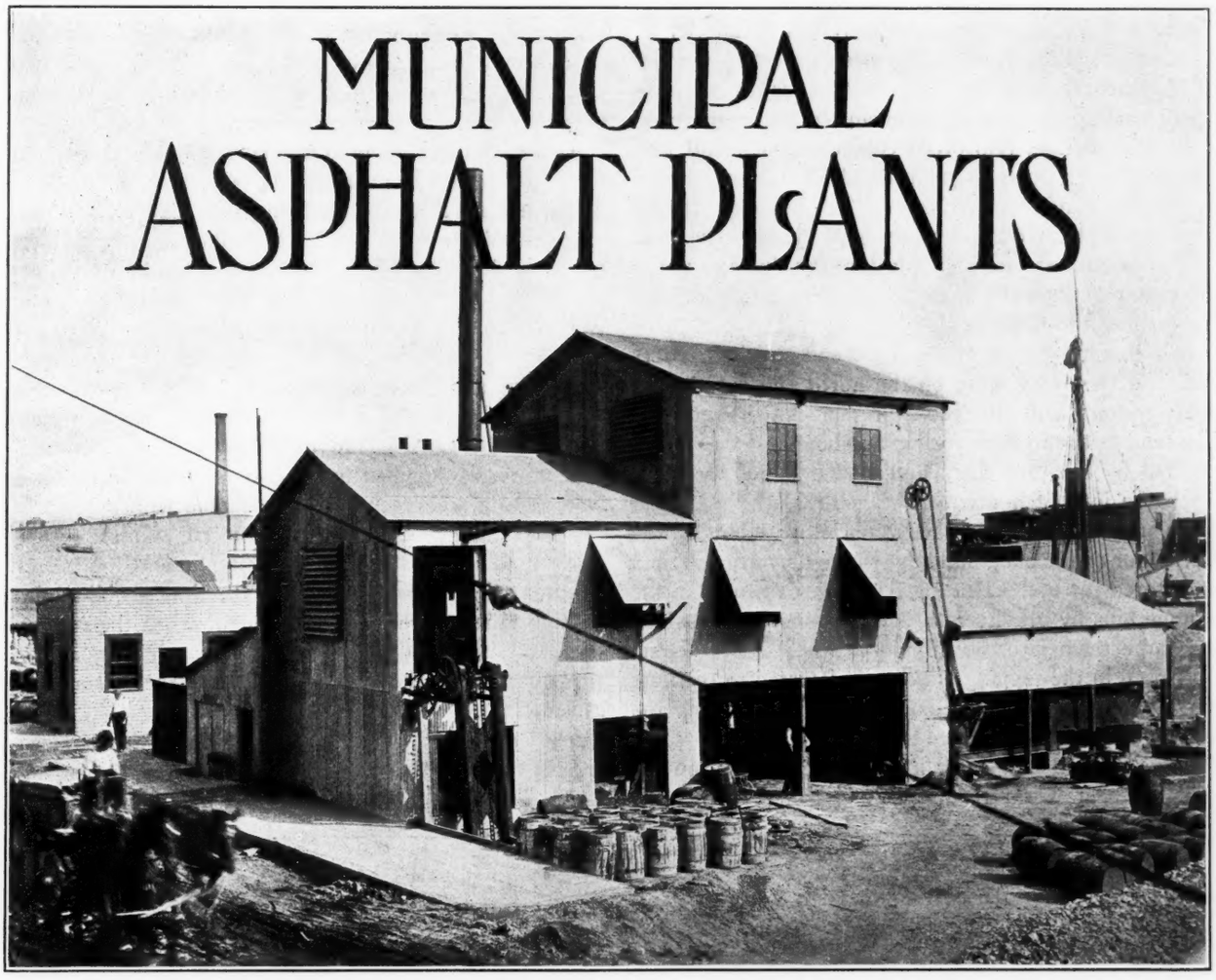
MUNICIPAL ASPHALT PLANTS



GENERAL VIEW, BROOKLYN, N. Y., ASPHALT PLANT

DURING the past four or five years an increasing number of cities have been installing municipal asphalt plants, to be used in some cases for repairs only (the Municipal Code of Columbus, Ohio, for instance, does not permit the city to do any other kind of work); but in a number of cities new paving is being done by these plants. At the present time permanent plants are owned by Montreal, Toronto and Winnipeg, in Canada; and by Brooklyn, N. Y.; Pittsburg, Pa.; New Orleans, La.; Columbus, O.; Indianapolis, Ind.; Bluffton, Ind.; Omaha, Neb.; Detroit, Mich.; Ft. Worth, Tex.; Seattle, Wash., and San Francisco, Cal.; with possibly one or two others, information concerning which has not reached us.

The Canadian cities were the leaders in this branch of municipal ownership, as they have been in others. The first plant to be built in this country was, we believe, that at Detroit, Mich., and a description of the work done by this plant during the five years of its existence is described in another part of this issue. More or less complete descriptions of the various plants may be found in past issues of the MUNICIPAL JOURNAL AND ENGINEER as follows: Toronto, Oct. 21, 1908; Winnipeg, Nov. 6, 1907 and Dec. 30, 1908; Brooklyn, N. Y., Aug. 7, 1907 and July 15, 1908; Pittsburg, Pa., Sept. 2, 1908; New Orleans, La., Nov. 6, 1907 and Dec. 30, 1908; Indianapolis, Ind., Oct. 28, 1908; Ft. Worth, Tex., Jan. 15, 1908; San Francisco, Cal., Nov. 11, 1908.

Some of the more recent data concerning these plants which have been collected by us within the past few weeks, and which refer to the work done during 1908, will be found in a table in connection with this article. Additional information not capable of being so tabulated is given below concerning several of these plants.

BROOKLYN, N. Y.

This plant was erected in 1907 by the Warren Asphalt Paving Company, and is located at the corporation yard on the Gowanus Canal. It is a double mixing plant, having separate driers, mixers and storage bins for binder and for asphalt surface. It has a capacity of 1,500 square yards of finished asphalt pavement per day of nine hours. The enclosing building is strictly fireproof, having a steel frame, galvanized corrugated iron walls and roofing, reinforced concrete floors, and iron stairways. The only wood used about the building is in two doors and window frames. The building is about 30 x 70 feet, located in the center of the yard. The main section is three stories high and through this and under the two mixers on the second floor pass two driveways for loading the wagons.

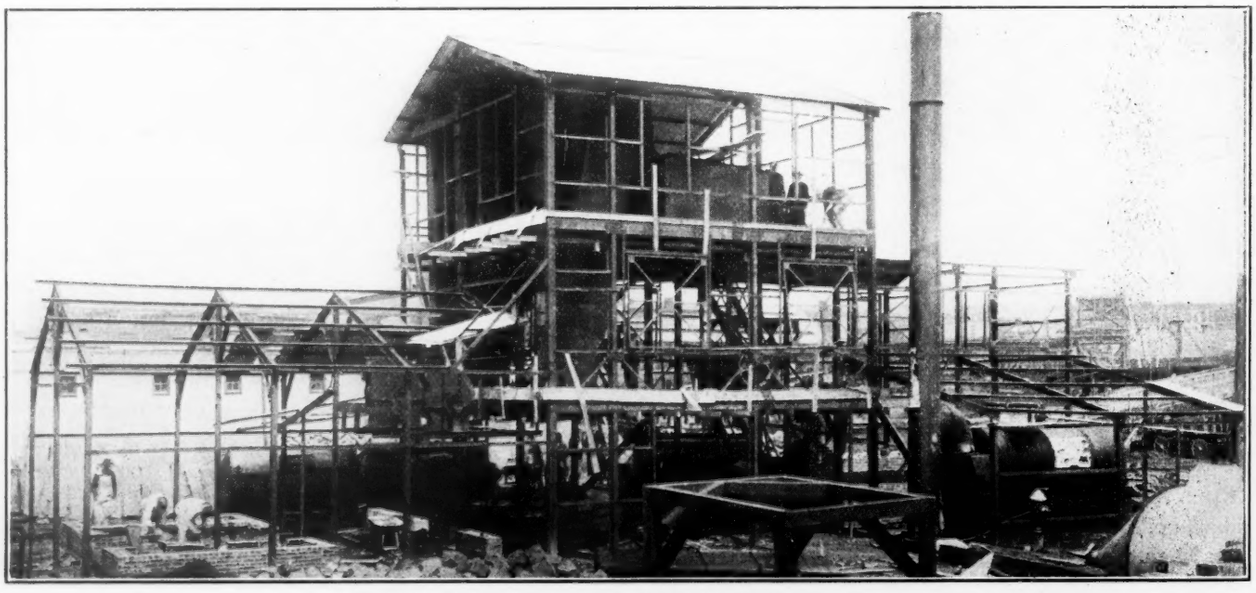
In a one-story wing at the south end are three driers and in a two-story wing on the north end are the asphalt melters and the power equipment. There are two sand driers and one for heating binder stone. These are fed by separate chain and bucket elevators which discharge into each drier. When dried the sand and stone are elevated to their respective storage bins on the third floor of the main building, where they are screened and stored for use. Hot materials are drawn from the storage bins by gravity into the weighing boxes, which discharge them into the mixing tanks. The limestone dust used in the topping mixture is elevated to the dust storage bin by an enclosed elevator running from the ground floor. To eliminate the difficulty found in causing this dust to flow after it has settled in the bin for some time, a worm revolving in a trough works the dust from this from the storage bin end to the weighing box.

The driers are of the rotary cylindrical type, and the heated air and gases pass outside the revolving drum and back through the inside. They are placed with their longitudinal axes parallel to the longitudinal axis of the building, as is shown in the photograph; the fire boxes being at the extreme right hand end of the illustration. The boiler-plate shells surrounding the drums are 50 inches in diameter and about 20 feet long, including about 10 feet of fire box. The drum proper is 40 inches in diameter and has a slight pitch toward the outer end. Longitudinal radial vanes on the inner surface carry the material up and drop it through the heating gases. Forced draft is maintained by a suction blower.

There are three enclosed mechanical agitating melting tanks which may be operated independently or together. These are so arranged that any one may be used to supply asphalt to either the top mixer or the binder mixer as desired. The asphalt is elevated by means of compressed air through 4-inch standpipes to the asphalt weighing bucket which is suspended in a traveling carriage supporting the scales.

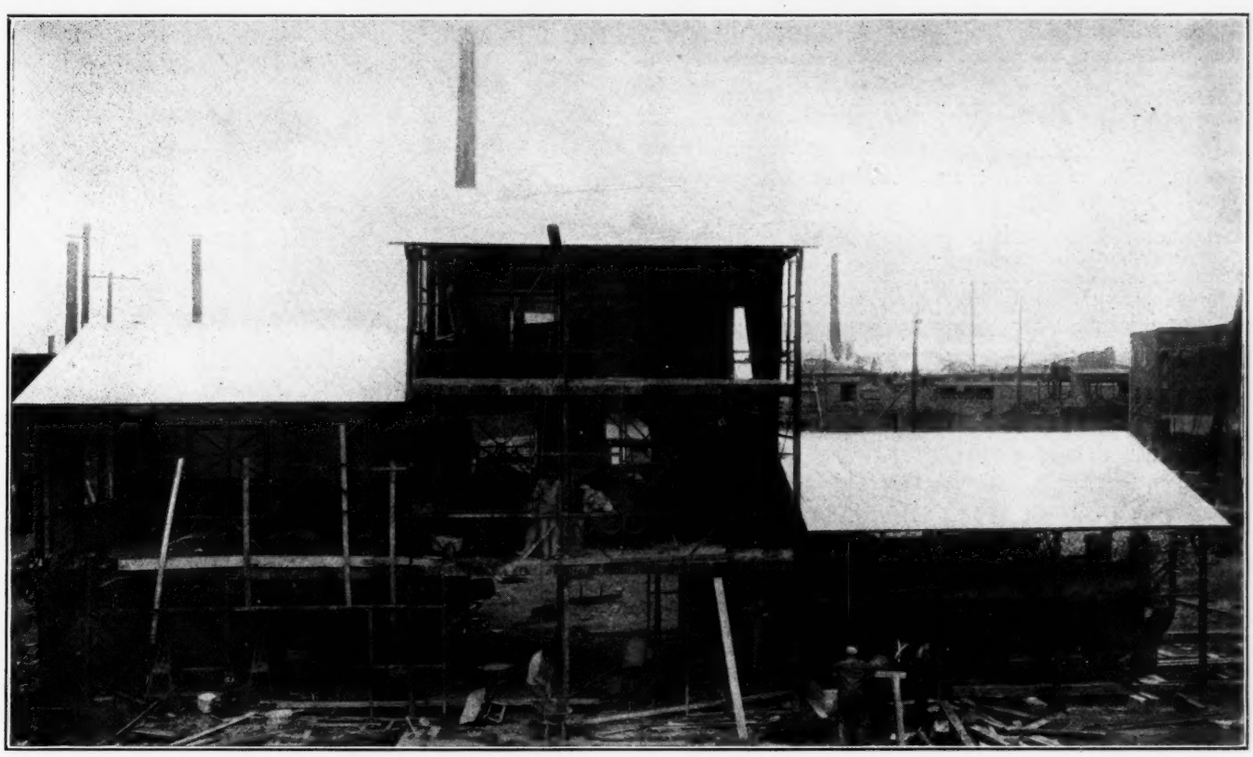
Topping and binder are mixed in independent mixers, having a capacity of 1,000 pounds to a batch, which discharge by gravity into the wagons driven beneath. The power is supplied by a 60-horsepower water-tube boiler and a 50-horsepower Erie engine with automatic cut off. An 8-horsepower engine of similar design operates the mechanical agitating tanks and the barrel elevator which elevates the asphalt, thus enabling the melting tanks to be operated at night when the rest of the plant is not running. A Knowles air compressor furnishes air to the asphalt tanks and for raising the asphalt into the weighing buckets.

The amount of work done in 1908, and the itemized expenditures for that year are given in the accompanying table. The costs are not given per square yard, as the



BROOKLYN, N. Y., PLANT DURING CONSTRUCTION

Drier foundations at the left; smoke piece and fans to the right, abo ve; sand bins on third floor; mixer and elevator casing, second floor, center; boiler to the right.



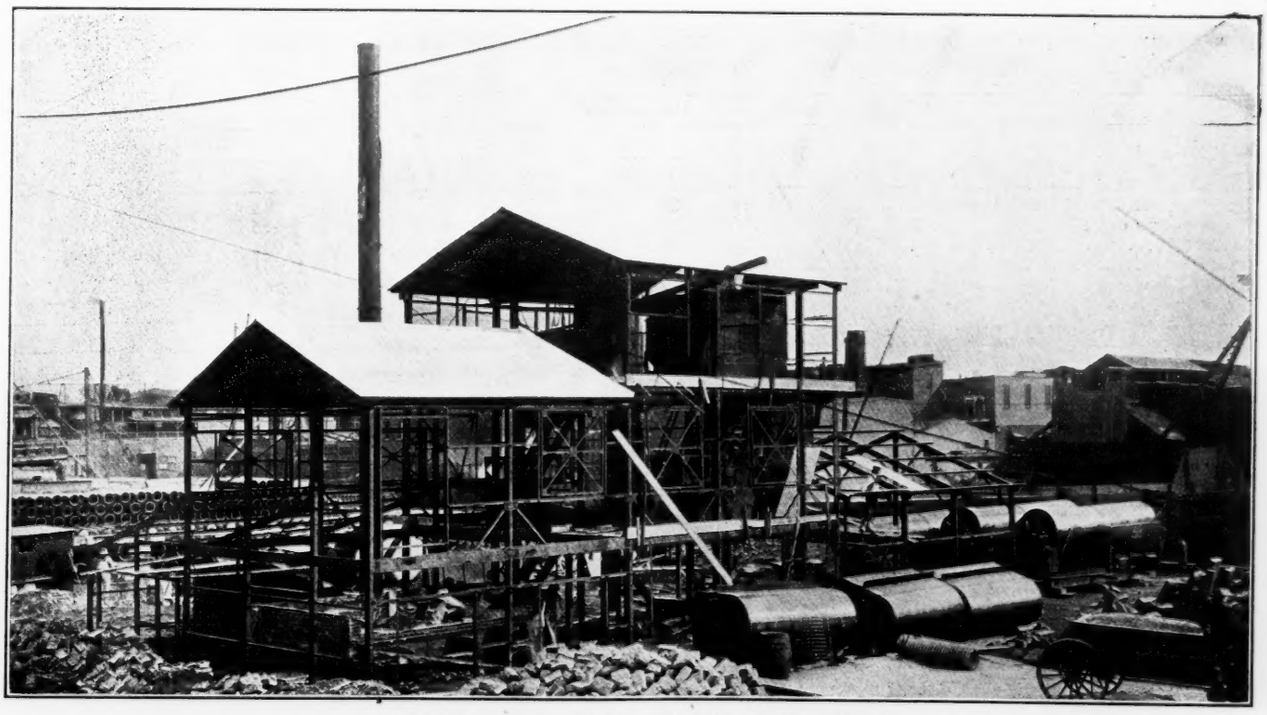
BROOKLYN, N. Y., ASPHALT PLANT NEARING COMPLETION
Barrel elevator at extreme left; melting tanks in position.

areas of patches are only approximately known; but the average cost per square yard is estimated to have been as follows: Superintendence and fixed charges, 2.7 cents; repairs and supplies, 2.7 cents; materials, 24.7 cents; labor, 81.3 cents; vehicles, 22.4 cents; total, $1.339.

The variation in cost of labor with the amount of work done is shown by the fact that in June, when 3910 boxes were made, the unit cost for labor was $2.952; while in December, when only 1177 were made, the cost was $5.251.

The last contract price for surface mixture laid by private parties was 81.5 cents, as compared with 75.8 cents, the cost by this plant.

On Jan. 1, 1908, there were 1,321,521 square yards of asphalt pavement out of guarantee; on Jan. 1, 1909, there were 2,515,160 square yards; and in 1910 there will be about 3,200,000. It is proposed to construct



BROOKLYN, N. Y., PLANT DURING CONSTRUCTION
Driers at the extreme right; melting tanks in the foreground; foundation for tanks at the left.

BROOKLYN ASPHALT PLANT

Expenditures

General superivision	$2,464.30		
Fixed charges	8,084.40		
			$10,548.70
General Expenses:			
Coal	$2,327.39		
Wood	1,594.83		
Supplies, oil, etc	729.43		
Cement	49.13		
Superintendent's automobile	2,015.94		
Dumping privilege	1,218.81		
Repairs to plant	1,456.64		
" " tools	614.81		
			10,006.98
Materials—Surface Mixture:			
1,240,500 lbs. refined asphalt, @ $24.80 per ton	$15,382.20		
67,300 " " " @ 28.40 " "	955.66		
211,287 " " " @ 23.50 " "	2,482.55		
		$18,820.41	
25,719.6 gals. of flux, @ 7⅜ cts	$1,896.82		
Less credit for empty barrels	317.50		
		1,579.32	
60.11 tons stone dust, @ $3.50	$210.38		
452.93 " " " @ 2.84	1,286.32		
Labor and freight	221.49		
		1,718.19	
3,922 cubic yards sand, @ 75 cts	$2,469.00		
3,327 " " " @ 85 "	2,827.95		
		5,296.95	
Total, 16,471 boxes of surface mixture			27,414.87
Concrete			2,238.35
Binder:			
50,000 lbs. refined asphalt, @ $24.80	$620.00		
2,700 " " " @ 28.40	38.34		
8,037 " " " @ 23.50	94.87		
		$753.21	
1,029 gallons of flux, @ ⅜ cts		75.89	
608.5 cubic yards binder stone, @ $1.45	882.43		
424.50 " " " " @ 1.40	594.30		
		1,476.73	
Total, 2.566 boxes of binder			2,305.83
Plant labor			19,152.41
Street labor			49,466.28
Trucking			13,719.75
Total expenditures			$134,853.17

Classification of Work

	Concrete Foundation	Surface Mixture	Binder
	Sq. Yds.	*Boxes*	*Boxes*
Maintenance of pavement	1,230.75	13,266	1,464
Special work	.....	697	411
Restoring pavement	7,067.00	2,508	691
Totals	8,297.75	16,471	2,566

Unit Costs

	Surface		Binder	
	Per Box	Per Cubic Foot	Per Box	Per Cubic Foot
Superintendence and fixed charges	$0.544	$0.062	$0.544	$0.060
Repairs and supplies	.516	.059	.516	.057
Materials	1.695	.194	.944	.105
Plant labor	1.031	.118	1.031	.115
Street labor	2.264	.259	2.264	.251
Vehicles	.579	.066	.579	.064
Totals	$6.629	$0.758	$5.879	$0.653

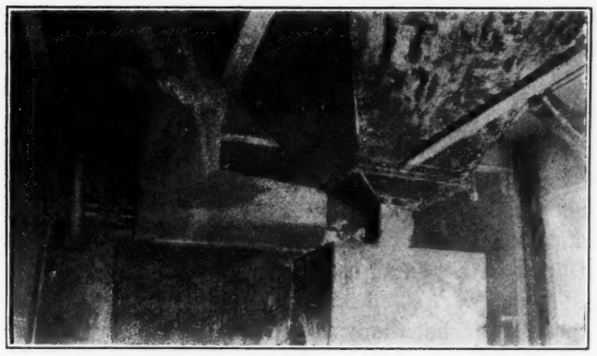
Unit Costs of Materials

Subdivision of Item in Above Table

	Surface		Binder	
	Per Box	Per Cubic Foot	Per Box	Per Cubic Foot
Asphalt	$1.163	$0.134	$0.608	$0.068
Flux	.098	.011	.027	.003
Sand	.327	.037	.....	.....
Stone dust	.107	.012	.....	.....
Binder stone	.....	.....	.309	.034
	$1.695	$0.194	$0.944	$0.105

Total Plant Product

Surface material	16,471 boxes	144,121 cu. ft.
Binder	2,566 boxes	23,094 cu. ft.
Total	19,037 boxes	167,215 cu. ft.



BROOKLYN SAND BOX, DUST CHUTE AND WEIGH BOX

another plant on the other side of the city to handle the increased yardage and reduce expenses of hauling.

The superintendent of the plant is Charles K. Leonard; W. H. Broadhurst is chemist; and John C. Sheridan is chief engineer of the Bureau of Highways.

BROOKLYN ASPHALT WAGON

Winnipeg, Man., Can.

This plant was first erected in 1899, was subsequently burned down twice and each time enlarged on re-erection, and as it now stands its capital cost, after deductions for sinking fund and interest, is about $58,000. It is used for all the asphalt paving work done in the city. Under date of Feb. 10, Warren Rodney, Superintendent of the plant, gave the following brief description of it:

We have two 55-horsepower boilers built by the Vulcan Iron Works, and one 55-horsepower engine rebuilt by the same firm; also one 35-horsepower engine which is used for running the mill stones at night. We have four 7-ton direct fire melting tanks. The asphalt cement is forced into the bucket by means of an air lift. Agitation is accomplished in the tanks by means of air. The air used for these various purposes is furnished by two Westinghouse air compressors.

The heating of sand and stone is done in two drums, one that was rebuilt here and the other a large Bartlett built in Cleveland. We have two bins for storing hot sand and stone.

We have one 14-foot Iroquois surface mixer and one 9-foot Iroquois binder mixer. Our dust or filler is ground at the plant by three Sturtevant mills which give an output of 20 to 25 tons per day of 24 hours.

Iron and concrete storage tanks for oil have a capacity for storing ten cars of oil.

We are contemplating an addition to the melting capacity and the installment of mechanical agitation. Our plant is not particularly well situated for the economical handling of material.

Binder and surface are generally sent out together as the plant is double throughout. The cost of labor for binder is 7 cents at the yard, hauling adds 3 cents and laying 2 cents per square yard to the cost. Surface material costs 10 cents at the yard, hauling 3 cents, and laying 4 cents, all per square yard.

The total average cost of paving in Winnipeg, including an allowance of 20 cents per square yard for maintenance, is as follows:

Grade and ballast, per sq. yd.	$ .25
Base, 6-inch P. C. concrete, per sq. yd.	.90
Binder and surface, per sq. yd.	1.10
Maintenance, per sq. yd.	.20
Use of plant, etc., per sq. yd.	.07
Tools and plant, per sq. yd.	.03
Other fixed charges (Supt., Engineering), per sq. yd.	.10
	$2.65

The following are the values of materials during last season:

Asphalt. As given above.	
Petroleum residuum (19 to 21 degrees Beaumé), ton.	$28.50
Surface sand f.o.b. cars plant; cu. yd.	1.15
Binder stone f.o.b team plant; cu. yd.	1.85
Pittsburg R. M. coal (used under tanks and boilers), ton.	6.20
Jack pine wood (used under drums), cord.	4.75
Portland cement, $2.30; bbl.	2.85

Wages paid were about as follows:

Foremen, $3.50 to $5.00 per day. Straight time.
Engineers and rollermen, $3.50 per day. Straight time.
Men in plant, 22½ to 30 cents per hour.
Asphalt experts (rakers, etc.), 35 cents per hour. One-half time rainy days.
Laborers, 20 cents to 25 cents per hour.

Since the construction of the plant the amount of paving laid each year has been as follows:

Year	New pavement sq. yds.	Repairs sq. yds.
1897	7,150	.....
1898	4,000	.....
1899	45,188	.....
1900	22,739	.....
1901	51,252	.....
1902	83,726	7,090
1903	62,723	1,658
1904	72,043	747
1905	107,317	4,262
1906	214,031	9,230
1907	151,150	12,953
1908	160,213	23,356

Seattle, Wash.

This plant has been recently completed, and in fact had not yet been accepted by the Street Department at this writing. It was constructed because of the fact that in a very short time the maintenance contracts on the asphalt streets will expire, after which the city expects to do its own repairing.

Bluffton, Ind.

This city installed its plant in 1906 for repairing pavements, the guarantee funds on which had been forfeited. It has a capacity of 1,000 square yards of 2-inch topping a day. It was constructed by Hetherington and Berner.

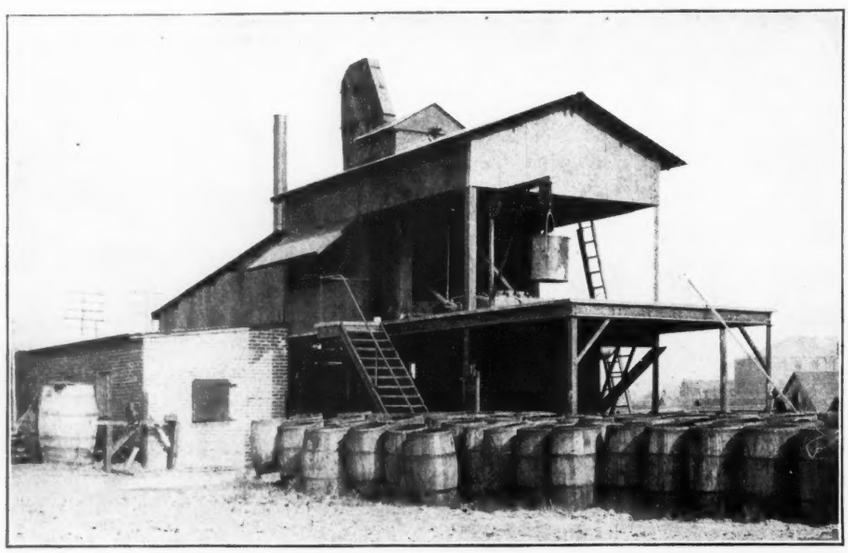
Dayton, Ohio

Work on the repair of asphalt streets during 1908 was commenced about June 1, and the plant was in constant operation during the balance of the year with the exception of about 30 days. There are in the city 446,800 square yards of asphalt pavement, 62,520 square yards of which are still under contractors' guarantee. The remaining 384,280 square yards are therefore maintained by the city and are now said to be in first-class condition, although at the beginning of the year their condition was most deplorable. In making this improvement 46,832 square yards of asphalt patches were laid, or about one-eighth of the entire surface. Most of these streets are from twelve to fifteen years old, and the amount of repairing which they require is increasing annually.

The itemized cost of running the plant during the year was as follows:

Labor at the plant	$ 7,844.43
Street labor	10,570.04
Oil	11.60
Louisville Cement	71.00
Portland Cement	140.00
Coal, 328,521 pounds	374.58
Tool repairs	84.05
Repairs at plant	355.97
Chemist	32.65
Stone dust, 960,000 pounds	2,328.00
Asphalt, 949,930 pounds	13,283.62
Sand, 9,035,200 pounds	5,239.37
Flux, 71 barrels	298.92
Pitch, 88 barrels	272.22
Printing bonds and advertising	166.75
Supplies	370.18
Lumber	242.68
Telephone	5.05
Electric power	382.76
	$42,073.87
Credit, sacks returned	701.69
Total expenditure	$41,372.18

This does not include interest, depreciation, superintendence, etc. The maximum yardage laid in any one day of twelve hours was 465. This information was furnished by McC. K. Huffman, Superintendent of Streets, and F. J. Cellarius, City Engineer.



PLANT AT DAYTON, O.
The San Francisco plant was built fro m the same plans as the Dayton plant.

Columbus, Ohio

This plant was built in 1907 by Hetherington and Berner, and is designed to have a capacity of 1,000 yards a day. It is located near the municipal water works and electric light plant. The buildings form an L, the main building being 20 by 56 feet and the engine and boiler house 17 by 23 feet; the former being of steel framework covered with corrugated iron, and the latter of brick with a shed roof.

The sand drier and heater is 16 feet long and has no central shaft, but the head end turns on heavy trunions running in water boxes and protected by steel shields from abrasion by sand. The driving apparatus, at the rear of the drum, consists of a 7-inch journal attached to a solid cast head filling the entire end, which is driven by a beveled gear and belt connected with the main engine shaft. The drum has a novel feeding arrangement, in that sand, after being shoveled into a boot, is carried by the usual chain bucket elevator and delivered directly into the center of the head. A small door in the head permits an interior view of the operation of the drum, and if the delivery by elevator should break or become clogged, it is possible to shovel sand through this door. An exhaust fan, attached at the head, draws off dust and moisture from the drum. Heat is supplied by three furnaces for drying the sand. A chain bucket delivers sand through a ten-mesh screen to the sand bin, below which is a measuring box of eight cubic feet capacity.

There are two kettles of closed type, each of 275 cubic feet capacity, built over brick furnaces which have arches sprung full length beneath the kettles so that no direct flame reaches the latter and the asphalt is thus protected from being burnt. Asphalt is delivered to the kettles by a platform elevator. The kettles rise about 18 inches above the mixer and are provided with 20 by 26-inch manholes. Agitation is both by air and mechanical. Melted asphalt is drawn off through a steam jacketed pipe and the delivery valve over the measuring box also is steam jacketed. A small pipe is provided at the top of each kettle for inserting a thermometer to take the asphalt temperature.

Delivery of all the material required for a batch is under the direct control of the man operating the mixer, and no assistant is required on the mixer floor. The sand box is directly over the mixer; the asphalt measuring box, after being filled, is brought by trolley to the same position, together with the double bar scales so that the weight may be verified by the operator; the stone dust box also is brought to position for emptying into the mixer; each of these operations being effected by a lever.

A driveway through the build-

ing permits the rapid loading of wagons and it is possible to load one carrying five batches every five minutes.

Operation for 1908 began May 13 and closed Sept. 11, with a stoppage of only two days between these dates on account of rain and two legal holidays. During that time 39 streets were patched, the total area being 18,689 square yards, and the cost being $14,716.15; a cost per square yard of 78.75 cents. This cost is made up as follows:

3,165,650 lbs. of sand	$1,266.27
332,777 lbs. of asphalt	3,998.78
300,015 lbs. of limestone dust	420.12
64,224 lbs. of flux	816.81
9,583 lbs. of cement	29.70
284,106 lbs. of fuel	220.17
Labor	7,020.62
Miscellaneous items	944.77

Weights include all shrinkage, cooperage on asphalt, water in sand and other losses. The miscellaneous cost includes lubricating oil, coal oil, waste, repairing tools, etc.

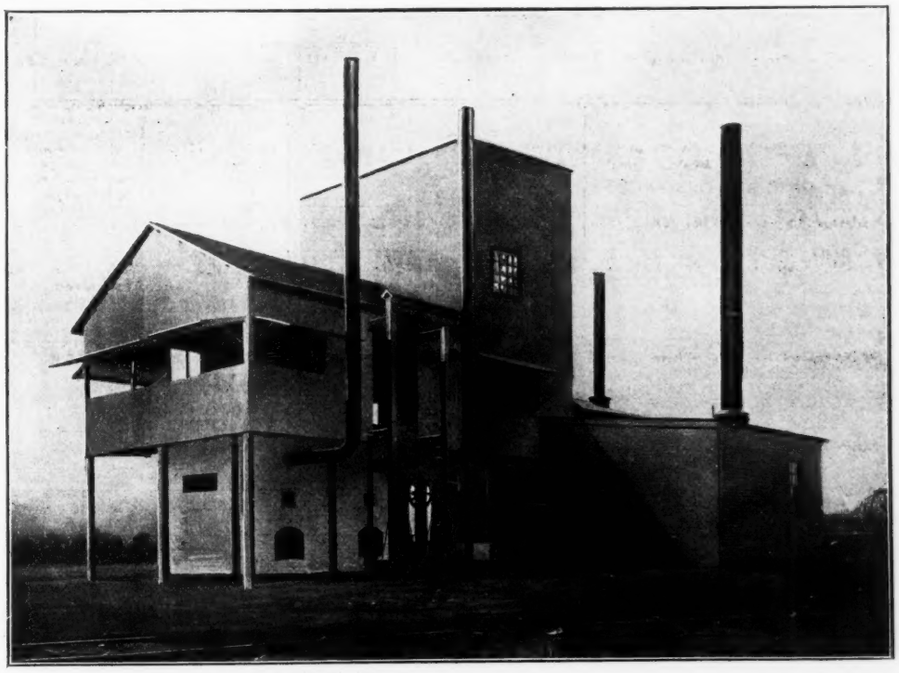
It is seen that nothing is included for fixed expenses, superintendence, etc., except that the salary of the superintendent of the plant for four months is included under "Miscellaneous items."

The pavements on which patching was done were from twelve to twenty years old. There was also laid 185 cubic yards of asphaltic concrete to replace cement concrete which had worn deeper than three inches; the cost of this being $5.19 a cubic yard. Teams cost 40 cents an hour, and common labor averaged 22.22 cents per hour. Mr. W. W. Horn is superintendent of the plant.

INDIANAPOLIS, IND.

Work at this plant during 1908 continued from June 16, when its construction was completed, to Dec. 31. In this time 14,798 boxes of surface mixture for the city and 1,893 boxes for West Michigan street were turned out. The plant also turned out 373 boxes of binder for the city work and 1,357 boxes for West Michigan street; a total of 18,421 boxes during the season. (West Michigan street was still under guarantee by the Barber Asphalt Company and was not included with the other work.) This amount of asphalt was used for making 75,428 square yards of surfacing for the city, 9,504 on West Michigan street; also 7,540 square yards of private work were done. The binder was used on the 9,504 square yards of West Michigan street and on 1,767 square yards of private work. The repairs and private work included 52 different streets. Concrete from 2 to 6 inches thick and having an area of 4,026 square yards cost $1,399.66. Also 441 square yards of 6-inch concrete were used in refilling private cuts. The private work done for water, gas, electric street railway and other companies brought in $12,330.72. Excluding the West Michigan street work, the total cost was 64.2 cents per square yard, this including interest at 5 per cent. and depreciation at the same rate; these, however, being calculated for 6½ months only, although nearly a complete season's work was done. Deducting profit on private work and also the concrete, the cost was found to be 52.4 cents per square yard, this including superintendence, interest, depreciation, insurance, lease on grounds, etc.

The work was done under the most favorable conditions, many of the repairs being large and close together, only one day being lost on account of rain and four while waiting for materials. During the season but seven hours were lost on account of the plant; two



COLUMBUS, O., ASPHALT PLANT

caused by a broken driving pinion and five while replacing brick work in the sand drier furnace.

The material cost as follows: Trinidad asphalt, $20 per ton; limestone dust, $3.00 per ton; residuum, 5 cents per gallon; sand, 90 cents per cubic yard; common labor, 20 cents per hour; asphalt experts, $2.50 per day of 8 hours; teams, $3.50 per day; roller engineers, $3.50 per day; foremen, $4.00 per day.

The plant was built by Hetherington & Berner, being of the style caled by them the "Intermedial," and having a nominal capacity of 1,000 cu. yds. per day. The main building is 63 x 20 feet, the wing 14 x 29 feet.

The cost of the asphalt plant, roller, buildings, tools and fixtures was $20,557.68.

This plant was illustrated in our issue for Oct. 28, 1908. The Columbus and Indianapolis plants are practically the same, except that the latter has three kettles, while the former has but two.

DATA CONCERNING MUNICIPAL ASPHALT PLANTS FOR YEAR OF 1908

	Manufacturer of Plant	Capacity in Sq. Yds. 2 Inches Thick	Cost of Plant	No. of Sq. Yds. of Asphalt Surface laid in 1908	Cost of Same per Sq. Yd.	No. of Sq. Yds. of Complete Paving laid in 1908	Cost of Same per Sq. Yd.	Details of Base, Surface, etc., of Each of the Preceding	Cost of Same per Square Yard
Montreal, Can.	Warren Asphalt Paving Co.	1,000	$19,000	49,495.0	$0.57½ .88	98,068.8	$2.51	6″ concrete base, 1″ binder, 2″ top	
Toronto, Can.	Warren Asphalt Paving Co.	1,500	33,522	39,735.0	.55	35,244.0	1.41‡	6″ and 4″ concrete base, 1″ binder, 2″ top.	4″concrete, 60c.; 6″ concrete, 73c.; 1″ binder, 15c.; 2″ top, 55c.
Winnipeg, Can.	Built by city (see description).	2,000	28,000	183,568.8	1.10	160,213.0	2.65	Av. cut, 1′; ballast, 3″ gravel; base, 6″ concrete; binder, 1½″; top, 2″.	Grading and ballast, 25c.; 6″ concrete, 90c.; binder and surface, $1.10.
Brooklyn, N. Y.	Warren Asphalt Paving Co.	1,500	22,485	82,000 (estimated)	1.64				
Pittsburg, Pa.	Kelly Road Roller Co.	1,000	12,000	70,715 of patching, 6,386 of new work.	Patching, 70.7c.; new work, 73c.	.....	.....	.....	Asphaltic concrete base 72.6c.
New Orleans, La.	Warren Asphalt Paving Co.	10,000	23,860	25,081	1.102	7,570.0	1.903	6″ concrete, noptha coat, 2″ top.	
Columbus, O.	Hetherington & Berner.	1,100	15,000	18,689.0	Cuts, 78.75				
Dayton, O.	Hetherington & Berner	500	10,500	46,832.0	88.4				
Indianapolis, Ind.	Hetherington & Berner	.....	20,558	92,472.0	52.4	4,467	.871	2″ to 6″ concrete base.; 1½″ surface; 1″ binder.	Binder and top, 52.4c.; concrete, 34.7c.
Detroit, Mich.	Hetherington & Berner	2,000	24,700	329,637.* 138,372.†	1.14426 .91174	104,089.0	1.05178	Repaving and resurfacing, 1½″ binder, 2″ topping; patching, average 3″.	

	Kind of Asphalt Used	Cost of Asphalt per Ton Delivered	Cost of Filler Delivered	Cost of Labor	Do Costs Include Interest on Investment, Depreciation, Lost Taxes, Superintendence, etc.	Remarks
Montreal, Can.	Bermudez.	$30.50	$8.75 per ton.	$2.00 per day.	No.	285,446.9 sq. yds. of all kinds of paving were laid in 1908 by municipal plant.
Toronto, Can.	California.	24.00	Limestone dust $6 per ton.	$2 per day of 9 hours.	Everything but lost taxes.	‡Includes cost of curb and gutter. Crushed stone cost $1.33 per ton on cars. Cement cost $1.87 per bbl. on cars. Sand cost 50.90 per cu. yd., delivered. See Municipal Journal and Engineer for Oct. 21, 1908.
Winnipeg, Can.	Bermudez, Pitch Lake.	28.89	$5 per ton.	On binder, 12c.; on surface, 17c. per sq. yd.	Everything.	In the total cost of paving is included maintenance, 20 cts., use of plant 7 cts., tool and plant 3 cts., other fixed charges 10 cts. The filler is ground at the plant. See Municipal Journal and Engineer for Sept. 23, 1908.
Brooklyn, N. Y.	Belmudez, California.	$24.80, $28,40 and $23.50.	$3.50 and $2.84.	$1.031 per batch of 1,000 pounds.	Yes.	Plant operated exclusively for repairs. See descriptive article in this number; also Aug. 7, 1907 and July 15, 1908.
Pittsburg, Pa.	Obispo.	26.10	.....	.....	Yes.	See Municipal Journal and Engineer for Sept. 2, 1908.
New Orleans, La.	Texas.	19.00	$5.76 per ton.	28.1 cts. per sq. yd.	Only superintendence.	Naptha coat made of equal parts vaporized gasoline and asphalt is painted in a thin coat on the concrete base; makes a waterproof layer and increases bond between base and top. No binder used. See Municipal Journal and Engineer for Nov. 6, 1907 and Dec. 30, 1908.
Columbus, O.	Calif'nia (D grade), Trinidad, Cuban,	Average about 25.00	.....	22.22 cts. per hr., teams, 40 cts.	Everything but interest and depreciation.	Can not do straight work under municipal code.
Dayton, O.	California.	28.00	Stone dust $4.85 per ton.	39.3 cts. per sq. yd.	No.	
Indianapolis, Ind.	Maltha, California	23.00	Limestone dust $3 per ton.	20 cts. per hour.	Yes.	See Municipal Journal and Engineer for Oct. 28, 1908.
Detroit, Mich.	.....	.....	.....	.....	Yes; also 20 cts. per sq. yd. for maintenance.	*During five years of operation. In 1908 more than 200,000 sq. yds. of all paving. †City and private patching. See descriptive article in this number.

Portable Asphalt Repair Plants

As a large part of the repairing of asphalt pavements, especially when these are first out of guarantee, consists of small patches widely scattered, a portable plant has some advantages for this work; and has been used even where the city owned a permanent plant. The following brief descriptions may serve as representative of cities having portable plants.

Concerning the Newark, N. J., plant, Wm. A. Howell, engineer of the Department of Streets and Highways, writes:

Newark, N. J., has a small portable plant, used for repairing water, sewer and gas cuts, and for other minor repairs. Any extensive repairs or resurfacing is done by contract.

The approximate cost of the new plant was.....$250.00
The cost of the new fire wagon was..... 130.85
The cost of the new asphalt wagon No. 1 was..... 388.54
The cost of the new asphalt wagon No. 2 was..... 427.70

Asphalt wagon No. 1 is known as "Hooke's Combined Fire Wagon and Asphaltic Mixture Heater for Making Light Repairs of Asphalt Pavement," manufactured at Chattanooga, Tenn.

Asphalt wagon No. 2 was made by Cyrus Currier & Sons, of Newark, N. J. Wagon No. 1 has a capacity of 18 sq. yds. on general repairs and of 14 sq. yds. on cuts. Wagon No. 2 has a capacity of 25 sq. yds. per day on repair work and of 20 sq. yds. on cuts. The yardage given represents a thickness of 3½ inches of asphalt. It would be materially increased if binder was used.

The number of streets worked on during 1908 on which the guarantees had expired was 94.

Total yardage of cuts and repairs.....7,170.86 sq. yds.

Cost of work during 1908:	
Labor	$7,797.92
Material	4,404.72
Stable account	659.82
Total	$12,862.46

At Newport, R. I., a Hooke plant is used which cost $425 and which was used this year for repairing bitulithic in small patches, but which had been used during previous years, since its purchase in 1902, for repairing asphalt only. The amount of work done last year was not very considerable, the labor costing but $41.12 and the material $13.62. Our correspondent from Newport describes this heater as follows:

> The heater is provided with means for heating two smoothers and tampers at a time. The weight of our No. 2 heater is about 3,000 pounds. The material pan is in the form of a segment of a cylinder, and is made of a ⅜-inch steel plate. The outer shell is made of No. 12 steel plate, with an interior fire-box lining of cast-iron, but it is designed to substitute fire clay for the latter, to adapt the heater for coal as well as for wood as fuel. The fire-box is provided with cast-iron grate bars, beneath which an ash-pan is provided. In this ash-pan the asphalt rake is heated.
>
> The kettles containing the asphaltic cement are removable, and the holes from which these kettles may be temporarily removed are closed by means of hinged covers, which, when not in use, are suspended at the forward end of the heater. Perforations in the doors of the fire-box permit the closing of the latter while the smoothers and tampers are being heated. The heaters are made so as to be drawn by hand or by being attached to the rear of a wagon.

At Watertown, N. Y., the same apparatus is used. The tools used in connection with it consist of a 14-inch by 7½-inch asphalt smoother; another 7 by 10 inches; a 6 x 8 asphalt tamper, three asphalt rakes, two asphalt cutters, two draw-off faucets, three buckets, two potato forks for mixing, and two shovels. The cost of the entire plant f.o.b. Chattanooga was $465, and the freight on the same was $24. This was used last year to put in about 3,000 yards of patches at a cost of $2.50 to $2.75 per square yard.

At Sandusky, Ohio, the same kind of plant was used for repairs and resurfacing. During the year 1,163 square yards of surface and binder were laid at a cost, including removing old pavement, of 52.2 cents per square yard for labor and 73.2 cents for materials, or a total cost per square yard of $1.254. The average crew consisted of a foreman and four men. The binder course was mixed in the machine but the surface course was purchased already mixed, being broken up and reheated in the portable heater. The plant was in operation 50 days, so that the average yardage per day was about 23; the highest run being 75 square yards in ten hours. All patches consisted of 1-inch binder and 1½-inch surface; the former consisting of a mixture of 1 yard of ¾-inch limestone, 0.44 yard of lake sand, and 155 pounds of Sarco asphalt cement.

At San José, Cal., work designated as "bitumen pavement" (probably a form of bituminous concrete) is done with the use of very simple apparatus, described by V. M. Trace, Superintendent of Streets, as follows: "Our bitumen plant is composed of wooden tanks with steam pipes laid in the bottom. We have a large steam roller and run that up beside the tanks, connect up with a union and the trick is done. Our bitumen is cooked by steam. We use steel lined dump cars to deliver the bitumen from the corporation yard where it is cooked to the street where it is to be used. The plant cost about $160.00 and was built under my direction. We can cook enough bitumen to lay 3,000 square feet of street 2 inches thick in eight hours."

Home-made Asphalt Repair Plant

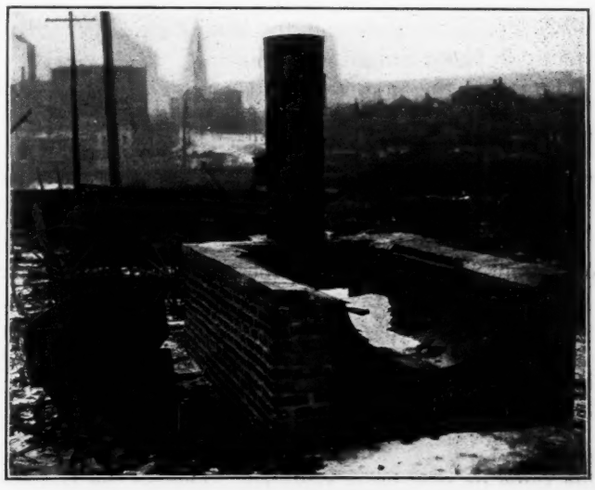
The city of Joliet, Ill., has about 110,000 square yards of asphalt paving. The traffic on most of this is not particularly heavy, so that from this cause little repair is necessary. But there are numerous small cuts for underground work which, of course, have to be repaired. Formerly the repair was required to be made by the person opening the cut, which proved unsatisfactory.

City Engineer H. A. Stevens and Street Superintendent John Friedrich decided that a more satisfactory solution would be for the city to do all such repairing and make a reasonable charge for the same. To do the work a heating pan and a small fire wagon for heating tools were built.

The heating pan is made of boiler plate in a segmental section, supported by brick work, and is about three and one-half feet wide by six or seven feet long. The supporting walls are about thirty inches high and there is a fire space of about eighteen inches between the bottom of the pan and the ground. A chimney rising about seven feet provides sufficient draft for the fire.

In operating, the asphalt is placed on the pan, which is open at the end, and allowed to become plastic. Then the right proportion of sand is added and the mixture is turned back and forth from one end of the pan to the other by two men with shovels, one standing on each side. When the mixture is hot enough and thoroughly mixed, it is placed in a wagon and carted to the street where needed.

While this method is in a manner a makeshift, it has demonstrated its practical worth. The total cost of the heating pan, home-made fire wagon and tools was about $180, and this amount was saved on one repair job alone—a rather large section at a street intersection which had to be surfaced and for which the contractor's bid was $250.00. The actual cost with this apparatus was about $60.00. A charge of about $3.00 a yard is made for repairing ordinary cuts.



ASPHALT PAN, JOLIET, ILL.

General Street Repairs

Of the many replies received to inquiries concerning street repairing, there were few exceptions to the general statement that no special apparatus was employed for repairing anything but asphalt pavements. For macadam, Crookston, Minn., uses "The ordinary picks, shovels and 20-pound hand tampers." Springfield, Mass., however, uses six steam rollers which cost $18,500, and scarifiers and the usual hand tools costing $1,500, in general street repair and construction; having done about $130,000 worth of this kind of work last year. Springfield also rents its rollers for work both in and out of the city at $15 per day, everything furnished.

The village of Sandy Hill, N. Y., uses a road machine, wheel scraper and horse roller which cost about $450, for constructing and repairing macadam. Last year it constructed about a fourth of a mile of macadam 18 feet wide and 12 inches deep, resurfaced a half-mile of road with No. 1 crushed stone and laid 1,650 square yards of brick paving, at a cost for labor of $4,900 and for material of $3,800, engineering and other expenses amounting to $1,225. For the macadam construction a steam roller was leased for twelve days.

Passaic, N. J., reports the use of ordinary tools, costing $146, for top dressing macadam, relaying cross walks, repairing gutters, etc. Last year four streets were top dressed and repaired at a cost of $300 for labor, $3,410 for materials.

In Baltimore the city makes repairs with its own forces, where these do not require a special plant; that is to say, it repairs rubble stone, macadam, Belgian block, vitrified brick, and asphalt block. Asphalt blocks are purchased from a plant in the city which manufactures them; paving brick and Belgian blocks are purchased from dealers in those materials, as are also stone for the rubble pavement and crushed stone for macadam. A road roller is used for macadam, but this is the only special appliance employed. Bitulithic pavement is all still under guarantee. Sheet asphalt repairs are let by contract in January of each year, separate bids for topping, binder and foundation being received, accompanied by a five-year guarantee for patches of over 100 square yards and a one-year guarantee for smaller ones.

Brick pavements are reported in most cities as needing practically no repairs. For instance, Iowa City, Ia., reports that the first brick paving put down in 1895 "never had any repairs except replacing paving torn up for making sewer and water connections." Mechanicsville, N. Y., reports brick pavements put down ten years ago, "and as yet have had to do no repairing." In Council Bluffs, Ia., there have been "little or no repairs on the brick pavements except on a few streets that were paved about twenty years ago with a brick inferior to that used to-day." In one Illinois city, approximately three miles of streets are paved with brick on stone foundation with sand filler. When any settling occurs in the street, bricks are taken up and the foundation leveled up with stone screenings and sand and the same or new brick replaced. During the last five years, however, this city has spent no money on repairs. Elmira, N. Y., uses rammers and brick hammers for repairing brick and stone pavements; having done 1928 square yards of this last year at a cost of $799.55 for labor and $150.90 for materials; an average cost of about 49 cents a square yard. Carbondale, Pa., contracts for brick repairs, the last work having been at the rate of $2.20 per square yard including the four-inch foundation.

NEW TREATMENT FOR OLD PAVEMENTS

By E. W. GROVES, City Engineer, Ann Arbor, Mich.

We have in this city (Ann Arbor, Mich.) 47,327 sq. yds. of asphalt block pavement, all laid on a gravel foundation. The first pavement of this kind, amounting to 19,790 sq. yds., was laid in the fall of 1900 at an expense of $2.20 per sq. yd. To a close observer it was evident that the pavement would not prove satisfactory after a term of years, but the property owners seemed to want it and as a consequence 12,483 sq. yds. additional was laid in 1902, and still more in 1903. The city had a bond guaranteeing the pavement for five years, but, as is usual in such cases, was unable to reach the company.

About the year 1905 it was evident that the city would be obliged to renew the first pavement within the next five years unless something could be done to stop the disintegration. The edges of the blocks were worn off to such an extent that the pavement was rough and caused passing vehicles to make an unusual amount of noise.

The writer began experimenting with various materials for a wearing surface and as a result of these experiments found that a thin coating of coal tar, covered with enough sharp sand to take up the tar, gave the best results. The pavement should be thoroughly cleaned and the tar applied hot and on a warm day. We used a low wagon, which was moved by hand, upon which was placed our tar kettle, fuel, and two barrels of tar. The tar was applied with brooms and the sand spread by hand while the tar was still hot. No attempt was made to stop traffic. The only disagreeable feature was that for two or three days the tar adhered to the shoes of passing pedestrians. In the summer of 1908 we treated 23,273 sq. yds. at an expense of two and one-half cents per sq. yd. and are much pleased with the results.

The joints between the blocks are filled with the composition to such an extent that very little evidence exists as to the material below the surface. The appearance of the street is about the same as that of a sheet asphalt pavement.

From present indications, I feel warranted in predicting that one application will last two and one-half years, *i.e.* by this treatment we will get a wearing surface for one cent per sq. yd. per year and use our old pavement for a foundation.

We expect to treat the remainder of our asphalt block pavements during the coming season and also a block of old brick pavement, as an experiment.

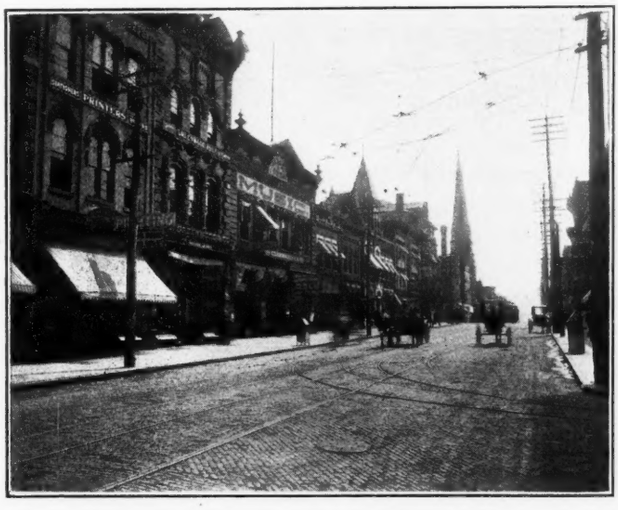
PAVING IN KNOXVILLE

Brick, Asphalt, Bitulithic and Granitoid—About Eleven Miles Laid in Two Years—City Pays One-Third, Property Owner Two-Thirds—Unit Costs

By R. P. WILLIAMS

In 1892 Knoxville, Tenn., had no paved streets. In that year and the one following $150,000 raised by bonds was expended for brick paving, after which no further paving was done until 1906, following the passage of the present law under which the abutting property owners pay two-thirds of the cost of paving and the city one-third.

In the past three years the city has laid four kinds of paving—asphalt, bitulithic, brick and granitoid. The kind of paving laid on any given street is decided wholly by council. All paving of any kind is laid on concrete foundation, 6 inches thick in the majority of cases and 5 inches thick in others; although no 5-inch foundations were used until last year. Before paving any street storm sewers are laid and catch-basins built if they do not already exist. Where there are street car tracks the company paves between rails and one foot outside of each rail in case of single track, but between the two outside rails only in case of double track. Where the street is paved with asphalt or bitulithic the street car company is required to use brick for its portion of the pavement. Last year, however, the city authorized the use of granitoid paving also between tracks.



BRICK PAVEMENT ON GAY STREET, FIFTEEN YEARS OLD

The brick used in the first paving in 1892 was from southwestern Virginia; and in many places where the pavement has not been disturbed for laying water or gas pipes this brick is as good as new and the concrete foundation unimpaired. This pavement cost $1.90 per square yard. During the last two years the city has put down 7,141 lineal feet of brick paving, which was done by the Southern Paving Construction Company. The total cost was $52,137.11, of which the city paid $23,641.81.

Trinidad sheet asphalt was laid by the Barber Asphalt Company to the extent of 15,723 lineal feet. The total cost was $129,329.18, of which the city paid $74,140.84. The Southern Paving Construction Company also laid 11,932 lineal feet of Bermudez asphalt at a total cost of $97,716.75, of which the city paid $42,611.56. Last year the R. S. Blome Company laid 8,156 lineal feet of granitoid paving at a total cost of $63,249.47, of which the city paid $31,914.22. In the granitoid pavement laid between tracks, where the bond wires join the rails, a space of about 2 feet by 4 inches is left open when the pavement is laid and a block is molded to fill this opening and is placed after the paving has set. Warren Bros. laid 11,953 feet of bitulithic, costing $99,622.91, of which the city paid $43,292.54.

GRANITOID STREET INTERSECTION, KNOXVILLE

The concrete base used under the first pavement, that on Gay street, was made with natural cement, as was that laid in 1907; but there has been much opposition to this and demand for the use of Portland cement.

In all the above costs there has been included not only the pavement proper, but excavation, curbs, catch-basins, sewers and other work. The actual prices for the pavement only were as follows: Brick pavement with cement filler on a 6-inch concrete base, $2.04 per square yard; Trinidad asphalt pavement on a 6-inch concrete base, $1.95; Bermudez asphalt pavement on a 5-inch concrete base, $1.78; granitoid pavement, $1.88; Bitulithic pavement on a 6-inch concrete base, $2.05. The prices for earth excavation were 40 and 45 cents per cubic yard in the several contracts; loose rock excavation, 50 cents; solid rock excavation, $3.50. Concrete curb, including taking up the old curb, 44 and 51 cents per lineal foot; metal curb protector in place from 12 to 40 cents per lineal foot in the various contracts; catch-basins, 18 by 36 inches, complete, cost $20 to $24 each.

The total amount paid by the city is seen to be considerably more than one-third of the total cost. This is due to the fact that the city pays for street intersections, for grading, crosswalks and other general items.

The city has already decided on at least 4 miles of streets to be paved this year and petitions are being received for still further amounts. In determining upon the streets to be paved special effort is made to keep the paved sections as continuous as possible so as to reduce to a minimum the dirt tracked onto them from unpaved streets.

DETROIT'S MUNICIPAL ASPHALT PLANT

Full Record of Five Years' Operation of the First Municipal Plant in the United States—Detailed Cost of Operation—More Than a Half Million Square Yards of Work Done

By LEN G. SHAW

WHEN the subject of a municipal asphalt plant for Detroit, Mich., was first broached by the council there was determined official opposition in some quarters, and troubles came thick and fast. The first difficulty encountered was in obtaining a site. It didn't matter particularly what location was selected by the council, opposition developed. Almost before a spot would be announced as under consideration protests would begin to pour in. Whether in the vicinity of effete Jefferson avenue, where it was feared the odor of asphalt would rob residents of their sleep; up in the Polish settlement near Milwaukee Junction, where odors were commonly supposed to attract no attention; or out in the west side, where every gust of wind brought an overpowering stench from the stock yards, the result was the same. The council was obdurate, however, and as regularly as a site was found unavailable another would be selected and the war continued.

Finally, upon the urgent recommendation of former Commissioner of Public Works Wm. H. Maybury, a municipal asphalt plant was installed in the spring of 1904. It was made by Hetherington & Berner, of Indianapolis, and rated at 1,500 square yards of two-inch topping, compacted asphalt, per day of ten hours. This was the first municipal asphalt plant established in the United States, and it proved an unqualified success from the outset.

The services of Clarence A. Proctor had been secured in 1903 through A. W. Dow, formerly inspector of asphalt and cements for the district government at Washington, for the inspection of contract work. Upon the installation of the plant he was placed in charge, and has had complete supervision to date; and his energetic administration of affairs is largely responsible for the creditable showing made.

So pronounced a success was the venture, and so great the demand for more paving, that in 1905 it was decided to purchase a one-car portable Hetherington & Berner plant, with a rated capacity of 1,000 yards a day, to be operated in conjunction with the stationary plant. Soon this outfit was found inadequate for the requirements, and in 1907 two melting tanks were added to the stationary plant, increasing its capacity to at least 2,000 yards per day. Difficulty was experienced in finding a suitable location for the portable plant within reasonable distance of the work, and in 1908 it was sold.

Commissioner of Public Works J. J. Haarer, among the first to recognize the possibilities in this direction, and who labored indefatigably in behalf of the project when in the council, suggested the purchase of a Cummer plant to make up for the loss through the sale of the portable outfit. This brought the total output of the stationary plant up to 3,500 square yards of two-inch compacted asphalt topping in ten hours.

At the outset only a portion of the resurfacing was

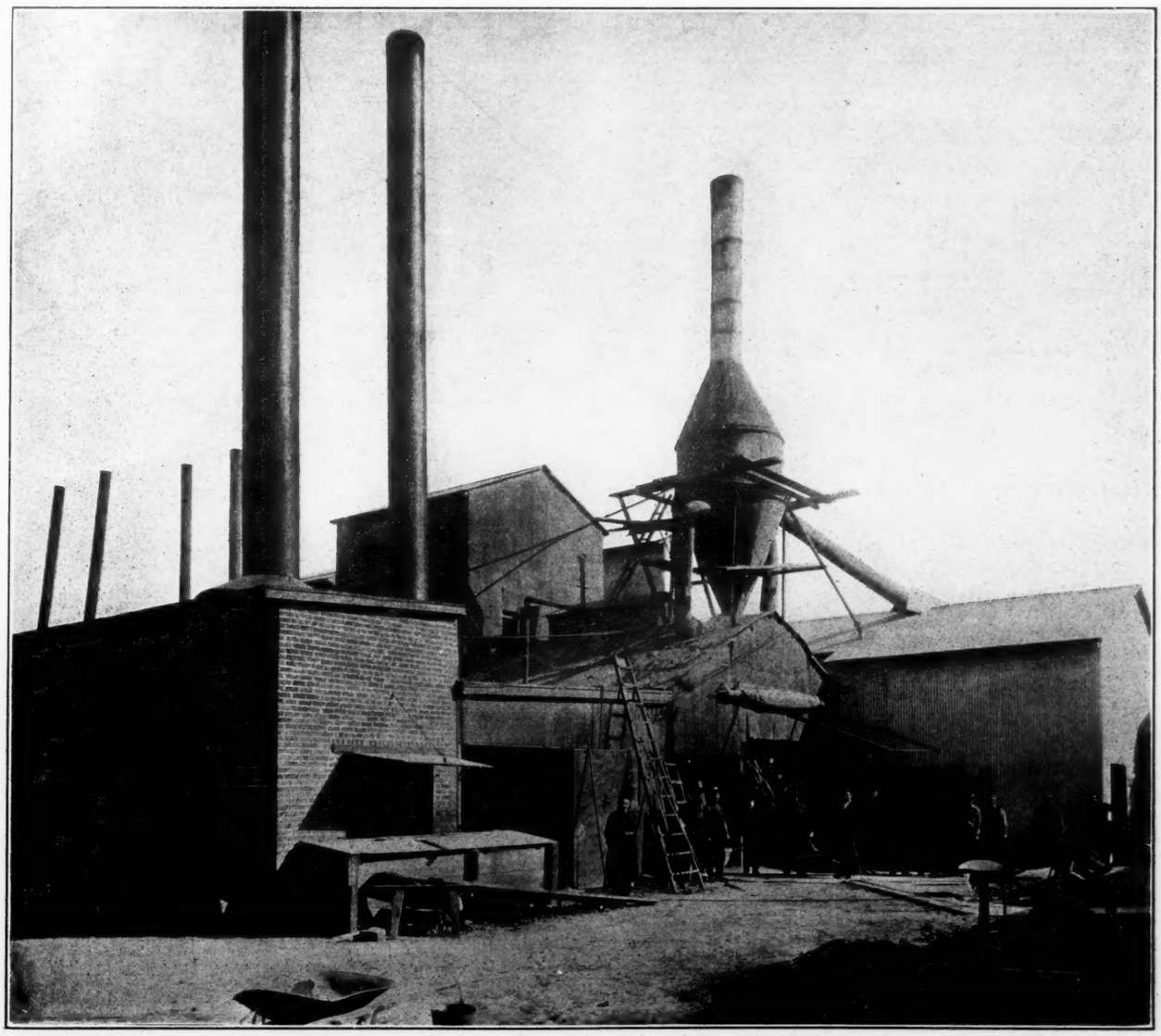
EAST VIEW OF DETROIT MUNICIPAL ASPHALT PLANT

done by the municipal plant, patching on streets where maintenance contracts had expired also being handled in this manner. Gradually, however, the scope of operations was enlarged, until during the last two years all the asphalt laid in Detroit has been done by the city. Bids for curbing and concreting are advertised for in conformity with charter requirements and contracts let; but the figure at which the city can lay asphalt is so much lower than the bids of contractors that the latter are rejected and the municipal plant does the work. Moreover, contractors who had maintenance agreements still in force were quick to realize that it was cheaper to pay the city for doing the work than look after it themselves. This, together with corporate patching, proved a source of revenue to the city, netting $13,119.48 during the five years.

Since the installation of the plant the city has done 329,636.75 square yards of resurfacing, 104,089.31 square yards of repaving and 138,371.94 square yards of city and private patching. Resurfacing, allowing for ten years' maintenance, cost $1.14426 per square yard, repaving, $1.05178, and patching, $0.91174. The lowest average contract prices for the same work were respectively $1.23, $1.30 and $1.12. This has resulted in a saving to the city during the five years, after deducting all expenses, of $82,916.41.

This showing is based on actual cost to the city, and where there were no actual expenditures or losses, such as interest, rent, water, light and taxes, these items were not taken into consideration. However, for the purpose of avoiding any criticism on this score they may be added in the following amounts: Interest on investment, five years at 5 per cent, $8,362.90; taxes, $2,031.65; rent, $3,000; water and light, $500; total, $13,894.55. This would add $0.02429 per square yard to the total cost, and, deducting this sum from the totals in the following table, reduce the net saving to the city to $69,021.86.

The first year the plant was in operation 40,000 square yards of asphalt was laid. In 1908 this had been increased to more than 200,000 square yards. A gratifying feature, aside from the immense saving, has



WEST VIEW OF DETROIT MUNICIPAL ASPHALT PLANT

RECORDS OF DETROIT ASPHALT PLANT TO DATE

Expenditures, Table "A"

Capital Expenditures:		
Buildings	$2,230.94	
Plant	24,702.55	
Portable plant	9,716.39	
Equipment	11,070.37	
Small tools	1,811.53	
Laboratory and office	1,188.94	
Total Capital Expenditures		$50,720.72
Operating Expenses:		
Salaries, expert and assistants	$13,774.51	
Sundry expense items	779.41	
Repairs and renewals	4,343.97	
Total Operating Expenses		18,897.89
Total expenditures except material and labor at plant		$69,618.61

Net Expenses, Table "B"

Salaries of expert and assistants		$13,774.51	
Sundry expense items		779.41	
Repairs and renewals		4,343.97	
		$18,897.89	
Less portion of salary of asphalt expert for years 1904–5–6 chargeable to inspection of contract work		3,500.00	
			15,397.89
Loss on sale of portable plant:			
Cost	$9,716.39		
Depreciation two years	1,943.28		
	$7,773.11		
Sold for	5,000.00		
			2,773.11
Estimated Depreciation on Capital Expended, on basis of 10 per cent. per annum:			
First year on $17,969.57 investment		$1,796.96	
Second year on $25,923.81 investment		2,592.38	
Third year on $35,238.97 investment		3,523.90	
Fourth year on $42,404.85 investment		4,240.49	
Fifth year on $45,720.72 investment		4,572.07	
On borrowed equipment for five years		1,705.00	
			18,430.80
Total expenses for five years			$36,601.80

Credits, Table "C"

Private Patching and amounts received for same:

Year	Sq. Yards	Amt. Received		
1904	10,327.88	$10,241.72		
1905	5,188.88	7,340.83		
1906	6,162.78	9,170.78		
1907	7,387.49	11,115.01		
1908	11,055.79	16,009.28		
Total	40,122.82	$53,877.62		
Cost to city at $1.01237 per square yard		40,619.14		
Net profit to city		$13,258.48		
Less demurrage 1906		139.00		
			$13,119.48	
Miscellaneous:				
Sale of empty oil barrels, gravel, use of rollers, etc			$902.42	
Use of plant by contractors			200.00	
Repaving for contractors			1,314.65	
Sale of mixture to contractors for patching			379.00	
Overage Venezuelan asphalt accounted for in former reports			160.03	
Allowance for fittings to tank car, extra labor and unloading			28.90	
Error in California oil charged 1906			308.99	
				16,413.47

Summary

Total square yards laid five years

Repaving and resurfacing were 1½″ binder and 2″ topping, compacted. Patching averaged 3″, mostly topping.

Resurfacing	329,636.75
Repaving	104,089.31
City and private patching	138,371.94
Total	$572,098.00

Nature of Work	Total Cost 5 Years' Production, Excluding Maintenance	Less Credits Table "C"	Net Cost Excluding Maintenance
Resurfacing	$312,156.11	$ 892.51	$311,263.60
Repaving	93,890.64	1,596.45	92,285.19
City and private patching	140,083.60	13,924.51	126,159.09
Total	$546,130.35	$16,413.47	$529,707.88

	Square Yards	Estimated Reserve 10 Years' Maintenance 20c Square Yard	Total Cost Including Maintenance
Resurfacing	329,636.75	$65,927.35	$377,190.95
Repaving	*85,972.75	17,194.55	109,479.74
City and private patching	†	†	126,159.09
Total	415,609.50	$83,121.90	$612 829.78

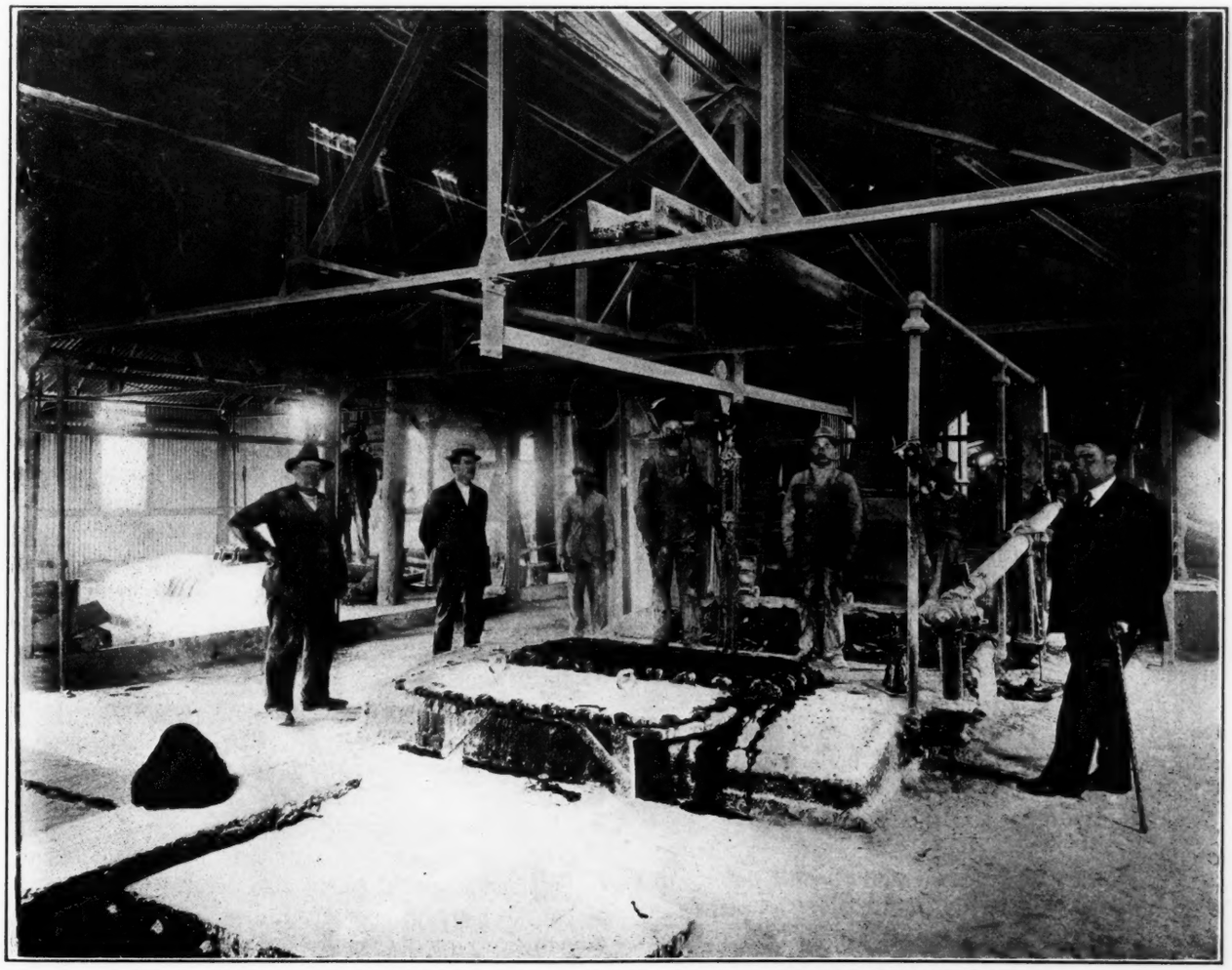
COST PER SQUARE YARD

Nature of Work	Labor and Material	Overhead Charges Table "B"	Total Cost Excluding Maintenance	Net Cost Excluding Maintenance	Total Cost Including Maintenance
Resurfacing	$0.883	$0.06397	$0.94697	$0.94426	$1.14426
Repaving	.83805	.06397	.90202	.8866	1.05178
City and private patching	.9484	.06397	1.01237	.91174	.91174

COMPARATIVE

Total Cost to City	Lowest Average Contract Price	Total Contract Price	Net Saving to City
$377,190.95	$1.23	$405,453.52	$28,262.57
109,479.74	1.30	135,316.10	25,836.36
126,159.08	1.12	154,976.57	28,817.48
$612,829.87		$695,746.19	$82,916.41

* Difference 18,116.56 square yards laid for contractors and maintained by them. † No maintenance on patching.



THREE CLOSED MELTING TANKS AND AGITATORS, DETROIT ASPHALT PLANT

TWO OPEN MELTING TANKS

been the superior quality of pavement secured. There has been no maintenance on any of it to date, and every foot is in good condition at the present time.

In computing the cost of repaving and resurfacing it will be noticed that 1 1-2 inches of binder and 2 inches of topping (compact) were used, and that the patching average was three inches, mostly topping. This is considerably more than is used in many cities for like purposes, and while giving more lasting results it likewise increased the cost over what would have been the case had a less amount been used. The cost of labor has been based on eight hours per day, street foremen being paid $4, rakers $3, smoothers and tampers $2.50, roller men $3.50, watchmen $2.20, laborers $1.75, and teams $4.

For those desirous of making an exhaustive analysis of the five years' record, tables covering that period are given.

ASPHALT IN THE UNITED STATES

Sources of Asphalt Used in the United States, and Producers and Importers of the Same—Increasing Business in Native Asphalt

In a letter to the Ways and Means Committee of Congress concerning the tariff on asphalt and its compounds, J. W. Howard, of New York, has given some interesting information concerning the present status of asphalt production in the United States. He divides the several producers and importers of asphalt into groups, and discusses them as follows:

The California group of producers consists of about ten producing companies combined under the leadership of the manager of what is understood to be the sales department of the Union Oil Company, and Manager of the "California Asphaltum Sales Agency," of which Mr. Filmore Condit is Resident Eastern Agent at New York. This agency and about a dozen other competing producers in California have a special freight rate to the Atlantic seaport cities of $10 per ton, with proportional reductions to interior points. The California and other domestic asphalts have for many years been sold at a lower price than imported asphalts almost everywhere in the United States, including the Atlantic Coast; while they enjoy a practical control of the center and western part of the country because of their advantage in freight charges. The California asphalt is produced more cheaply probably than any other in any part of the world. It is obtained from an asphalt-base oil which is found in enormous quantities over large areas of the State, and which, with little labor and using some of the oil itself as fuel, is made into refined asphalt. The extent of its successful competition with other asphalts seems to be regulated entirely by freight charges.

A Trinidad group leases a deposit in Trinidad, West Indies, from the Crown of England. It comprises the new Trinidad Lake Asphalt Company and the Barber Asphalt Paving Company, which are owned or controlled by the General Asphalt Company. This group directly or indirectly controls or produces American asphalts in California and other States. It is possibly the strongest group and does not depend entirely upon either foreign or domestic asphalt, but uses both in various cities throughout the country.

The A. L. Barber Asphalt Company imports Bermudez asphalt from Venezuela and sells it to members of the Independent Asphalt Association and others; twenty-five or more contractors and producers being included in this group. This asphalt, f.o.b. New York, costs the company $12.50 per ton plus $7 per ton paid to Venezuela. The asphalt must be further refined in this country, which refining involves a loss of about 28 per cent in volume. Its cost prevents this asphalt from offering more than a feeble competition with the domestic asphalts. Still, since the withdrawal of the Bermudez deposit from the control of the Trinidad group the exportation of this asphalt has enormously increased; it being believed by many that its use was kept at a minimum by the Trinidad interests when controlled by them.

There are a number of companies handling Texas asphalts, such as the Texas Company, The Sun Company, The Ellis Company and others which compete with each other and with other asphalts. These Texas asphalts are extensively used for many purposes and are sold at lower rates than those from any other source, both on the Atlantic Coast and in the Middle West.

A Kansas-Indian Territory group of producers has a large refinery in Kansas and competes, with its products of various asphalts or bitumens, over a large area as far east as New York City. This is probably the newest source of supply.

A Utah group of producers competes within itself and with others. It has long supplied special high-grade asphalt for various uses which, because of its peculiarly excellent quality for general purposes other than paving, is sold for the highest prices and even exported.

There are in addition producers of asphalt in its natural and prepared compounds, located in Kentucky and at other producing points in the United States. Although many of these individually are small, their aggregate production is large.

REVIEW OF THE YEAR'S PAVEMENT PROGRESS

Report of Committee on Roads and Pavements, Illinois Society of Engineers and Surveyors—Fillers for Brick Pavements—Cost of Pavements—Oil and Tar Treatment—Practice in Chicago

TAKING up a subject so broad as this one, it is difficult to decide what phases of the question should be presented.

It was suggested to your committee that information concerning fillers for brick pavement would be of interest and value to many members of the Society. The first thought was to have a paper prepared on this subject. After considering the matter it was decided to be a better plan to collect, if possible, considerable data on this subject as a basis from which a paper might later be given by someone who was interested; at any rate, to present data from as many sources as possible so that whatever opinion or judgment should be formed would not be from the experience of one or two men alone.

Circulars were, therefore, sent out to about 300 cities asking for their experience with various kinds of material for fillers. Replies were received from 87, giving, it is believed, as comprehensive information on this subject as has been collected. This information has been put in tabulated form and is submitted herewith.

Your committee has not drawn any definite conclusions from the data presented, but prefers rather to have this done by those who are interested enough to study the data as given. We believe it has been put in such shape as to be available readily for study, at the same time giving very complete information.

COST DATA ON PAVEMENTS

At the same time this circular was sent out, it was thought well to get the cost data on various kinds of pavement, and as this could be done at a small additional expense a second circular accompanied the one on data concerning fillers for brick pavement, asking the cost on various kinds of pavement laid in 1908. This information has been tabulated and is submitted herewith.

RURAL HIGHWAYS

In the construction of rural highways, your committee would call particular attention to the reports of the State Highway Commission, in which will be found much interesting information on this subject. The experience of the Commission shows conclusively that there is no serious engineering difficulty in constructing gravel or macadam roads on any of the soil conditions to be encountered in Illinois; that this is purely an economic question and to be decided upon this consideration alone.

OIL AND TAR TREATMENTS

The use of oil and tar in road construction is attracting the attention of road builders the world over, particularly as the effect of modern motor traffic has completely changed the conditions of wear on roads that suffer any great amount of this kind of traffic. So important a consideration has this become that an international congress was called to convene in Paris during October last. At this congress were a number of representative road builders from the United States. The result of their observations was to the effect that European practice had nothing to give to the best practice in use in this country so far as the methods of construction were concerned; but that in regard to maintenance European practice is far ahead of conditions found in most sections of the United States even where there is a large mileage of macadam roads.

The question of supplying a macadam road with an elastic and at the same time a tough and durable binder is one still in an experimental stage although good results have been obtained with the use of both tar and asphalt compounds.

The object of this treatment is to provide a binder which will not be dislodged by the action of motor traffic or wind and rain. If this is accomplished the macadam itself is held firmly in place, and the road suffers no deterioration, as is the case with the ordinary stone or gravel binder under severe motor traffic.

Somewhat similar in action to the effect of motor traffic is produced on roads in the vicinity of unimproved roads on very sticky soil. The mud is carried by the wagon wheels onto the macadam or gravel, and adheres to the finer particles and picks out the binder between the pieces of rock composing the surface of the road, thus loosening the bond and eventually loosening the stones themselves, so that in Illinois there is perhaps a field for the application of an oil or tar binder aside from the question of motor vehicle traffic.

Some experiments of the State Highway Commission go to show, however, that this effect of the sticky mud can be overcome in a great degree by applying sand to the mud road, to serve as a protection at the end.

The advantage, however, of having a binder of waterproof material is that the stone could be considerably less in thickness and, therefore, built somewhat cheaper, perhaps enough cheaper nearly to pay for the tar or oil treatment. This treatment, to be effective, should not be a mere surface treatment but should be thoroughly incorporated with the upper layer of macadam for a depth of at least two or three inches. To do this on an old road it becomes necessary to loosen the surface of the road, thoroughly harrow it to drop the finer particles through the coarser material, add what coarser material may be necessary to bring the surface to a true grade, and then apply the tar or oil, as the case may be, covering the same with screenings or sand.

In the case of new construction, the road is built as ordinarily except that it is well to put a binder on the first course so that the tar or oil will not run to the lower layers of the road but will be retained in the upper course of the construction. Built in this manner, it requires about two to two and a half gallons of tar or heavy asphalt oil per square yard.

COST DATA ON PAVEMENTS

TO ACCOMPANY REPORT OF COMMITTEE ON ROADS AND PAVEMENTS, ILLINOIS SOCIETY OF ENGINEERS AND SURVEYORS

MACADAM

REPORT FROM	FIRST COURSE			SECOND COURSE			Material for Binder Course	Required Thickness Completed	Cost Complete per Sq. Yd., Exclud'g Curb
	Thickness, Loose	Size of Material	Kind of Material	Thickness, Loose	Size of Material	Kind of Material			
Birmingham, Ala.	4″	½–2½″	Slag	4″	Dust up..	Chert	None	6–8″	40–50 cts.
Bridgeport, Conn.	Rolled 4″	¾–2″	Trap rock..	Rolled 2″	1–1½″	Trap rock	Screenings	6″	$0.65
Hartford, Conn.	12″	6–12″	" " "	6–8″	2″	" "	¼″ and dust	12″	.51
Harvey, Ill.	6″	2½–4″	Limestone.	6″	1½–2½″	Limestone	Screenings	12″	.98
Rockford, Ill.	6″	4–6″	"	5″	1–2½″	"	"	8″	.40
Muncie, Ind.	6″	1–4″	"	6″	¼–1″	"	"	10″	.55
Richmond, Ind.	6″	2½–4″	"	Rolled 4″	2½″	"	"	12″	.80
Lowell, Mass.	5″	2½″	Tr'p r'k&sl.	3″	1¼″	Tr'p r'k & sl.	Trap rock & slate.	6″	.80
New Bedford, Mass.	12″	1½–3″	Granite				Screenings	12″	.50
Newton, Mass.	5″	2½″	Trap rock..	2″	1¼″	Trap rock	Dust & screenings.	6″	.70
Springfield, Mass.	4–7″	2″	" "	1½″	1¼″	" "	" "	..	.50–.75
Duluth, Minn.	6–8″	1″	" "	1½″	1″ D'n	" "	" "	7″	.70
Camden, N. J.	5″	2½″	" "	5″	1–11″	" "	" "	8″	.95–.98
" "	7″	1½–2″	" "	3″	½–1½″	" "	" "	7″	1.01
Cleveland, O.	9″	1–2½″	Limestone.	3½″	1–2″	" "	" "	12½″	2.25
Columbus, O.	8″	½–3″	"	6″	½–2″	Limestone	Screenings	12″	.80–.90
" "	5″	½–3″	"	4–6″	½–3″	"	"	6–8″	.56
" "	8″	0–6″	Sand stone.	6″	½–2½″	"	"	6–8″	.80
Dayton, O.	6″	1–4″	Lime stone.	3″	2″	"	"		1.09
Springfield, O.	5½″	3½–2½″	"	5½″	1½–2½″	"	"	10″	.45
" "	4″	3½–2½″	"	3″	1½–2½″	"	"	6″	.34
Toledo, O.	5–8″	2½–4″	"	4–6″	1–2½″	"	"	7–12″	.56
La Crosse, Wis.	8″	1–3″	"	3″	2–5″	"	4½″ granite with screenings	12″	90
Madison, Wis.	2x4-12x16	6–8″	"	4″	1–3″	"	Screenings	12″	.70–.85
" "	6″		"	6″		"	"	9″	.55–.65
Sturgeon Bay, Wis.	7″	3–4½″	"	5″	1½–2″	"	"	9″	.58½
Washington, D. C.	6″	2″	Trap rock..	3″	¾″ D'n	Trap rock	"	6″	.60–.75
Chicago, Ill.	11″	6″	Slag	Rolled 3″	1–2½″	Limestone	Cinders & screen's.		1.20
" "	Rolled 8″	6″	"	" 4″	1–2½″	"	" " "		.79
" "	" 6″	4″	Limestone.	" 3″	1–2½″	"	" " "		1 28

ASPHALT

Report From	Kind of Foundation	Thickness of Foundation	Binder Thickness and Character	Kind of Asphalt	Thickness of Asphalt	Approx. No. Sq. Yards	Cost Per Sq. Yd. Exclusive of Curb
Birmingham, Ala.	Slag	6″	Bitumen	"Bitulithic"	2″	62,000	$1 90
Phoenix, Ariz.	Concrete	4″	1″	Trinidad	1½″	15,000	2.05
Hartford, Conn.	"	6″	1½″	Bermudez	1½″	7,350	City 2.43
						17,242	RR. 1.90
" "	"	6″	1½″	"	1½″	1,650	2.70
" "	"	6″	2½″	"	1½″	3,290	2.35
" "	"	6″	1½″	"	1½″	316	2.70
Champaign, Ill.	"	6″	¾″ size stone, 1½″ thick	Obispo	2″	9,500	2.15
Joliet, Ill.	"	6″	2″	Sarco	1½″	7,500	2.10
Auburn, Ind.	"	5″	Stone 1″ size d'n, 1″ thick gr scr'gs.	Trinidad	1½″	50,000	1.95
Ft. Wayne, Ind.	"	6″	1″ stone, 1″ thick	Sarco	1½″	21,122	1.75
Indianapolis, Ind.	"	6″	1″	Trinidad	2″	107,634	2.00
Kokomo, Ind.	"	6″	1½″	"	2″	11,000	1.80
South Bend, Ind.	"	5″	1″	"	1″	27,788	1.55
Duluth, Minn.	"	6″	1½″ gravel	"	2″	400	2.80
Camden, N. J.	"	4″	Stone 1″	"	1½″		1.64
" "	"	6″	" 1″	Bermudez	2″		1.99
Elizabeth, N. J.	"	6″	1½″	Trinidad	2″	3,100	2.63
" "	"	6″	1½″	"	2″	7,000	2.49
Buffalo, N. Y.	"	6″	1½″	"	2	20,431	Inc. curb 2.80
" "	Old cem't or stone p'v't.	6″	1½″	"	2″	32,326	" " 2.12
Troy, N. Y.	Asphaltic concrete	6″	1½″ concrete	"	2″	865	2.76
Columbus, O.	"	6″	1″	"	2″		2.10
Dayton, O.	"	6″	1″ limestone with asp. cement	"	3″		1.98
Toledo, O.	"	6″	¼″ stone, 1″ thick	Trinidad / Acme / Obispo	2″	60,000	Old base, 1.30 New " 1 90
Youngstown, O.	"	4″	1″ stone with Asphalt cement	Trinidad	2″	6,040	Repave, 1.49
" "	"	6″	1″ stone with Asphalt cement	"	2½″	10,468	2.33
Chester, Pa.	"	6″	1½″ stone with Asphalt cement	"	2″	7,050	2.23
Erie, Pa.	"	5″	1″ broken stone	Bermudez	2″	251,236	1.37–1.69
" "	"	5″	1″ " "	Trinidad	2″	30,749	1.55–1.75
" "	"	5″	1″ " "	California	2″	5,945	1.65
Harrisburg, Pa.	"	6″	1″	Bermudez	2″	125,000	1.80
Scranton, Pa.	"	6″	1″ gravel with Asphalt cement	Trinidad	2″	50,161	2.18–2.60
Wilkes-Barre, Pa.	"	6″	1″	"	2″	6,000	1.19–1.60
Providence, R. I.	"	6″	1½″ stone	Bermudez	1½″	2,408	2.25
Washington, D. C.	"	6″	2″ compr's'd to 1½″	Bermudez, Cuban, Calif'nia	1½″	100,000	1.68
Chicago, Ill.	Concrete	6″	1½″ Asphalt, Cem't & Limest'ne	Various	2″	581,000	2.03

BRICK AND BLOCK

Report From	Nature of Foundation	Thickness of Foundat'n	Cushion Thickness and Character	Make of Brick or Kind of Block	Nature of Filler	Approx Number Sq. Yds.	Cost Excluding Curb
Birmingham, Ala.	Concrete	5″	2″ sand	Grave's Shale Brick	Sand	47,500	$1.90
Phoenix, Ariz.	"	4″	1″ "	Purington	Pitch	10,000	2.23
Bridgeport, Conn.	"	6″	1½″ "	Mack Block	Cement	5,567	2.79
" "	"	6″	1½″ "	U. S. Wood Co. Wood Block	Asphalt	874	3.40
Hartford, Conn.	"	5″	1–2″ "	Granite Block	Cement	1,000	4.00
Macon, Ga.	"	6″	1½″ "	Reynold's Block	Pitch	106,456	2.08
Cairo, Ill.	"	5″	2″ "	Peebles Block	Asphalt	50,000	1.99–2.04
Champaign, Ill.	"	6″	1½″ "	Culver Block	Sand	2,388	1.48
" "	"	6″	2″ "	" "	Grout	7,000	1.62
" "	"	6″	2″ "	" "	Asphalt	2,400	1.73
" "	"	6″	½″ "	Wood "	"	400	2.60
Decatur, Ill.	"	4″	2″ "	Black Danville Brick	Cement and asphalt	4,700	1.65
" "	"	6″	2″ "	" " "	" " "	24,275	1.85
" "	"	6″	2″ "	Terre Haute Brick	Asphalt	2,187	2.00
" "	"	4″	2″ "	Brazil Block	Cement	6,773	1.65
East St. Louis, Ill.	"	6″	2″ "	Albion	"	10,900	1.40
" " "	"	6″	2″ "	Banner	Asphalt	10,800	1.55
" " "	"	6″	2″ "	"	Cement	3,500	1.58
" " "	"	6″	2″ "	"	"	2,850	1.50
" " "	"	6″	2″ "	"	"	8,100	1.65
" " "	"	6″	2″ "	"	"	2,500	1.53
" " "	"	6″	2″ "	"	"	2,950	1.64
" " "	"	6″	2″ "	Granite Block	Sand	12,000	2.27
Galesburg, Ill.	"	4″	2″ "	Purington Block	Cement	4,224	1.67
Harvey, Ill.	"	8″	1″ "	" "	Sand	24,000	1.95
Joliet, Ill.	"	6″	6″ "	Barr Brick	"	6,000	1.65
" "	"	6″	6″ "	" "	"	700	1.94
La Salle, Ill.	"	6″	2″ "	" "	"	8,000	1.60
Moline, Ill.	"	5″	1½″ "	Purington Block	Cement Sand Plastic		1.79–1.90
Taylorville, Ill.	"	6″	2″ "	Springfield Brick	Asphalt	9,250	1.56
Winnetka, Ill.	"	8″	2″ "	Purington Block	Sand	6,000	1.70
Fort Wayne, Ind.	"	6″	2″ "	Metropolitan	Cement	15,132	1.65
" " "	Broken Stone	6″	2″ "	"	Sand	2,717	1.30
Indianapolis, Ind.	Concrete	6″	2″ "	Ind. Block	Cement	128,500	2.00
" "	"	6″	1″ "	Hard Pine	"	10,049	2.40
Kokomo, Ind.	Old macadam	8″	2″ "	Culver Block	"	8,000	1.30
Muncie, Ind.	Concrete	6″	1½″ "	Metropolitan	"	25,000	1.84
" "	"	6″	1½″ "	Wassel	"	21,000	1.62
" "	"	6″	1½″ "	Logan	"	20,000	1.58
" "	"	6″	1½″ "	Brazil Block	"	67,000	1.56–1.61
" "	"	6″	1½″ "	Metropolitan	"	20,000	1.59
South Bend, Ind.	"	6″	1″ "	Barr Block	"	3,010	1.34–1.47
" " "	"	6″	1″ "	Clinton Block	"	400	1.37
" " "	"	6″	1″ "	Indiana Block	Sarco Cement	5,039	1.32–1.44
" " "	"	6″	1″ "	Trimble Block	Pioneer	3,852	1.40–1.43
Covington, Ky.	"	6½″	1½″ "	Athens	Cement	12,530	1.85
" "	"	6½″		Spillman	"	16,000	1.82
" "	"	6½″		Portsmouth Granite	"	4,000	1.73
" "	"	6½″		" "	"	2,000	1.65
" "	"	6½″		Carlyle	"	2,900	1.84
Lawrence, Mass.	Gravel	6″	2–3″ sand	Granite	" 1	20,000	2.15
New Bedford, Mass.	Concrete	5″	2″ "	"	Sand	17,300	3.15
Springfield, Mass.	"	4½″	Dry cement mortar	Creo-Resinate	Cement		3.27
Chicago, Ill.	"	6″	2″ sand	Creosoted wood	Sand	32,270	3.44
" "	"	6″	2″ "	" "	Tar	17,900	3.49
" "	Slag	6″	2″ "	Purington and Metropolitan	"	28,050	2.05
" "	"	10″	2″ "	Metropolitan	"	1,410	2.25
" "	Crushed limestone	8″	2″ "	"	"	4,900	2.10
" "	Concrete	6″	2″ "	Various	" and grout	68,500	2.55
" "	"	6″	2″ "	Granite Block	"	83,700	3.89
Duluth, Minn.	"	6″	1½–2″ sand	Sandstone Block	Sand	600–400	2.40–2.70
Grand Rapids, Mich.	"	6″	1½″ "	Metropolitan Brick	Cement	15,930	1.80
" " "	"				Asphalt	1,540	1.90
" " "	"	6″	1½″ "	Trimble	Cement	22,300	1.80
" " "	"	6″	1½″ "	Medina Block	"	9,930	3.85
Kalamazoo, Mich.	"	6″	1½″ "	Metropolitan	Asphalt	12,000	1.94
Butte, Mont.	"	4″	2″ "	Granite Block	Sand	1,680	3.98
South Omaha, Neb.	"	5″	1½″ "	Purington Block	"	34,415	1.97–2.18
Binghamton, N. Y.	"	6″	1½″ "	Corning Shale Brick	Cement	8,975	1.61
Buffalo, N. Y.	"	6″	1″ " or Scr'gs	Various	"	16,854	2.60
" " "	Macadam	12″	1″ " " "	"	"	2,904	3.06
Troy, N. Y.	Old granite blocks re-laid	8″	1″ "	Johnsonburgh	"	5,277	2.30
" " "	Concrete	6″	1″ "	Shawmut	"	396	2.32
" " "	"	6″	1½″ "	Hassam Granite Block	"	6,350	3.00
" " "	"	9″	1½″ "	" "	"	6,850	3.00
Grand Forks, N. D.	"	6″	1½″ "	Norway and Tamrack Creosoted Blocks	Tar	37,000	3.02
Akron, O.	Sand	10″	2″ "	Akron Brick Block	"	25,000	1.07
" "	Slag	8″	2″ "	" " "	"	10,000	1.13
Barberton, O.	Concrete	6″	2″ "	Metropolitan	"	22,774	1.73–1.76
Chillicothe, O.	"	6″	1″ "	Union Paver	Cement	4,420	1.39
Cleveland, O.	Sand			Collinwood Shale Block, 5″	"	3,888	1.41
" "	"	8″		Bessemer 5″ Shale Block	"	5,101	1.39
" "	Concrete	6″	2″ sand	Cleveland 5″ " "	"	3,859	1.79
" "	"	6″	2″ "	" 4″ " "	"	7,771	1.88
" "	"	6″	2″ "	Metropol. 4″ " "	"	4,094	2.17
" "	Sand	8″		Bessemer 5″ " "	"	7,864	2.54
" "	"	6″	2½″ sand	Common Medium Sandstone	"	1,091	3.06
" "	"	8″		" "	"	1,440	3.08
Columbus, O.	Concrete	6″	1″ sand	Dressed Block, Medium Sandstone	"	1,529	3.22
Conneaut, O.	"	5″	Yellow Sand	Athens, Nelsonville	Tar		1.65
Coshocton, O.	Gravel	8″	2″ sand	Conneaut	Asphalt	20,000	1.63
" "	Sand and gravel		2″ "	Metropolitan	Tar	5,538	1.23
Dayton, O.	Concrete	6″	1″ "	Novelty	"	2,720	1.04
Findlay, O.	"	6″	2″ "	Portsmouth, Carlyle	Cement		1.45
" "	Macadam	8″	2″ "	Massillon	"	3,676	1.65
Ottawa, O.	"	7″	2″ "	Malvern	Tar	2,317	1.41
Newark, O.	Gravel	8″	2″ "	Bolen Block	Sand	60,000	1.25
" "	"	8″	2″ "	" "	"	5,015	1.12
" "	"	8″	2″ "	Townsend	"	4,995	0.99
Springfield, O.	Concrete	6″	2″ "	Logan	"	7,938	1.07
" "	"	6″	¾″ " and cement	Brick	Pioneer	6,000	1.80
Toledo, O.	"	6″	1½″ "	Asphalt Block	Cement	2,000	1.60
" "	"	6″	½″ cement mortar	Various Brick	Sand	6,400	1.91
Troy, O.	"	6″	1½″ sand	Asphalt Block	"	95,000	1.30–1.60
Youngstown, O.	"	4″	1½″ "	Townsend	"	12,000	1.90
" "	"	6″	1½″ "	Bessemer Block	Cement	38,000	1.80
" "	"	5″	1½″ "	" "	Asphalt, Cement	64,875	1.28–1.43
" "	"	4″	1½″ "	" "	" "	1,235	2.15
Chester, Pa.	"	2″	2″ "	Asphalt Block	" "	4,630	2.13
Scranton, Pa.	"	6″	2″ "	Vitrified Shale Brick	" "	4,360	1.98
Wilkes-Barre, Pa.	"	6″	2″ "	" " "	" "	4,950	2.23
La Crosse, Wis.	"	6″	2″ "	Clearfield Mfg. Co.'s Brick	Cement	3,778	2.17
Washington, D. C.	Gravel	5″	2″ "	Purington	"	12,000	1.97
Chester, W. Va.	"	8″	2″ "	Asphalt Block	Asphalt	3,000	1.90
				Fire Clay Brick	Sand	26,000	1.65
					"	43,300	98–1.14

DATA ON FILLERS FOR BRICK PAVEMENTS

TO ACCOMPANY REPORT OF COMMITTEE ON ROADS AND PAVEMENTS, ILLINOIS SOCIETY OF ENGINEERS AND SURVEYORS

ASPHALT

REPORT FROM	TRADE NAME IF IT HAS ONE	RESISTANCE OF PAVEMENT TO WEAR UNDER						DIFFICULT TO CLEAN				OBJECTIONABLE BECAUSE OF NOISE		Other Good Features	Other Bad Features	CONCLUSIONS BASED ON		
		HEAVY TRAFFIC			LIGHT TRAFFIC			HOT WEATHER		COLD WEATH'R						Approx. Miles of Pavement	Approx. Age of Pavement, Years	Approx. Years Under Observation
		Good	Fair	Bad	Good	Fair	Bad	Yes	No	Yes	No	Yes	No					
Cairo, Ill.	Pioneer	..	x	..	..	x	..	..	x	..	x	..	x	Easy to remove pavement	Bricks get loose	1¼	½	½
" "	Sarco	..	x	..	..	x	..	..	x	..	x	..	x	" " " "	" " "	¾	1	1
Youngstown, O.		..	x	..	x	..	..	..	x	..	x	..	x	Quiet. Permits Expansion	Slippery when cold		1	1
Winnetke, Ill.	Sarco	x	..	..	x	..	..	..	x	..	x	..	x	Keeps subgrade dry; not slippery; Elastic		1/16	10 mo.	10 mo.
Conneaut, O.	Pioneer	..	x	..	..	x	..	..	x	..	x	..	x	Glare reduced; easy to repair pavement; does not crack		2½	2	2
Terre Haute, Ind	"	..	..	x	..	..	x	x	..	x	..	..	x		Loses life; bricks chip	3	3	3
Toledo, O.	"	..	x	..	x	..	..	..	x	..	x	..	x	Protects edges brick; easy to repair	Expensive	½	1	1
La Salle, Ill.		..	..	x	..	x	..	x	..	..	x	..	x			¼	3	3
Kalamazoo, Mich	Pioneer	x	..	..	x	..	..	..	..	..	..	..	x	Easy to clean; does not disintegrate				5
South Bend, Ind.	"	..	x	..	x	..	..	..	..	..	x	..	x			5	8–10	10
" " "	Sarco	..	x	..	x	..	..	..	..	..	x	..	x			½		6 mo.
Chillicothe, O.	Pioneer	..	x	..	..	x	..	..	..	..	x	..	..			¾	3	3
La Salle. Ill.	"	x	..	..	x	..	..	..	x	..	x	..	x			¾	3	3
New Albany, Ind.	"	x	..	..	x	..	..	..	x	..	x	..	x			¾	½–2	½–2
La Crosse, Wis.	Sarco	x	..	..	..	..	..	..	x	..	x	..	x			¾	1	1
Baltimore, Md.	Pioneer	..	..	x	..	..	..	x	..	x	..	x	..	None at this time	Blocks get loose	55 ft.	½	½
" "	Fairfield	..	x	..	..	..	..	..	x	..	x	..	x	" " " "	" " "			
" "	Sarco	..	..	x	..	..	..	x	..	x	..	x	..	" " " "	" " "	8 ft.	½	½
Taylorville, Ill.	"	x	..	..	x	..	..	..	x	..	x	..	x			¼	3	3
Moline, Ill.	Pioneer	..	..	..	..	..	..	x	..	..	x	..	x			¼	½	
Decatur, Ill.	"	x	..	..	x	..	..	..	x	..	x	..	..	Elastic; quiet		3	1 to 11	4
"	Sarco	x	..	..	x	..	..	..	x	..	x	..	..	" "		1	1	1
Springfield, O.	Pioneer	..	x	..	x	..	..	..	x	..	x	..	x			9	8	3

TAR

Woonsocket, R. I.	Special Tar Cement	x	..	..	x	..	..	..	x	..	x	..	x	Reported satisfactory				
Toledo, O.		..	x	..	x	..	..	..	x	..	x	..	x	Cheap; easy to repair	Brittle when cold	5	15	15
Coshocton, O.	Tar with 10% Asptm	x	..	..	x	..	..	..	x	..	x	..	x	Elastic		6	1–10	10
Richmond, Ind.	No. 6 Coal Tar	x	..	..	..	..	..	..	x	..	x	..	x		Runs to gutter in hot weather	1¼	4–16	
Moline, Ill.	" 6 Tar	..	..	..	..	..	..	x	..	..	x	..	x			¼	½	
Ottawa, O.		x	..	..	x	..	..	..	x	..	x	..	x		Runs to gutter in hot weather	1½	5–10	5–10
Baltimore, Md.	Warrens Puritan	x	..	..	x	..	..	..	x	..	x	.	x	Holds blocks rigid	None	170 ft.	1½	1½
" "	Barrets	..	x	..	..	..	..	..	x	..	x	..	x				½	½
Kalamazoo, Mich	Paving Pitch No. 6	..	..	x	..	x	..	..	x	..	x	x	..		Disintegrates and blows away			15
Pautucket, R. I.		x	..	..	..	..	..	..	x	..	x	..	x	Noiseless	Slippery at first	2,000 sq. yds.	17	17
La Crosse, Wis.	Pitch filler	..	..	..	x	..	..	..	x	..	x	..	x				1	1
Wilkes-Barre, Pa		x	..	..	x	..	..	..	x	..	x	..	x			5	0–14	
South Bend, Ind.	Pitch No. 6	..	..	x	..	x	..	x	..	..	x	..	x			5	8–10	10
Erie, Pa.		..	x	..	x	..	..	..	x	..	x	x	..			1½	15	15
Birmingham, Ala.	Pitch No. 6	..	x	..	x	..	..	..	x	..	x	..	x	Waterproof	Hard to repair	2¾	15	15
Cambridge Mass.	Nat'l Co.'s Pav'g Pitch	..	x	..	..	x	..	x	..	..	x	..	x		Bricks get loose			
Chillicothe, O.	Barrets No. 6	x	..	..	x	..	..	..	x	..	..	..	x					
Springfield, Mass.	Roofing Pitch	x	..	..	x	..	..	..	x	..	x	..	x	Reported satisfactory				
Macon, Ga.	No. 6 Paving Pitch	x	..	..	x	..	..	..	x	..	x	..	x					
Buffalo, N. Y.	" 4 " "	..	x	..	x	..	..	x	..	..	x	..	x	Can be used after 24 hours	Runs in hot weather; cannot be laid in wet weather	1¼	16–17	
Akron, O.	Barrets No. 6	x	..	..	x	..	..	..	x	..	x	..	x	Water-tight; bricks easily removed		40	1–17	15
New Albany, Ind	Coal tar with 10% Asp'	x	..	..	x	..	..	..	x	..	x	..	x			1	½–17	½–17
Columbus, O.	Barrett No. 6	x	..	..	x	..	..	x	..	..	x	..	x	Reported satisfactory		26	15	
Chicago, Ill.		..	x	..	x	..	..	..	x	x	..	..	x	Takes care of expansion		80	12	12

CEMENT GROUT

Harvey, Ill.		x	..	..	x	..	..	..	..	..	..	x	..			⅞	3	3
Conneaut, O.		x	..	..	x	..	..	..	x	..	x	x	..		Cracks	4	5–15	6
Terre Haute, Ind.		x	..	..	x	..	..	..	x	..	..	..	x			25	2–20	2–20
Harrisburg, Pa.		x	..	..	x	..	..	..	x	..	x	x	..					
Columbus, O.		..	x	..	x	..	..	..	x	..	x	x	..		Cracks	2	10	
Toledo, O.		..	x	..	x	..	..	..	x	..	x	x	..	Cheap; water-tight; protects edge of brick	Hard to repair	40	12	10
New Bedford, Mass.		x	..	..	x	..	..	..	x	..	x	..	x		Slippery when covered with frost	½	6	6
Ottawa O.		x	..	..	x	..	..	..	x	..	x	x	..		Cracks	2	5	5
Moline, Ill.		..	..	..	x	..	..	..	x	..	x	x	..	Keeps brick tight; prevents top expansion	Hard to repair	1½	1	1
Champaign, Ill.		x	..	..	x	..	..	..	x	..	x	x	..		" " "	4	1–3	3
Decatur, Ill.		..	x	x	..	..	x	..	..	..	..	..	..		Cracks	4½	3	3
Kokomo, Ind.		..	x	..	..	..	..	..	x	..	x	x	..	Durability		7	1–12	12
Joliet, Ill.		x	..	..	x	..	..	..	x	..	x	..	x		Ridges up at transverse expansion joints	1 block	5	5
Springfield, O.		..	..	x	..	x	..	..	x	..	x	x	..		Cracks	9	8	3
Centerville, Ia.		x	..	..	x	..	..	..	x	..	x	x	..	Protect brick	Cracks; ridges up in summer; hard to repair	6	2	2
Cairo, Ill.		x	..	..	x	..	..	..	x	..	x	x	..			1	2	2
Muncie, Ind.		..	..	..	..	..	..	..	..	..	..	..	..	Used in all pavement				
Richmond, Ind.		x	..	..	..	..	..	..	x	..	x	..	x	Good binder; easily applied		¼	6	
Youngstown, O.		x	..	..	x	..	..	..	x	..	x	x	..	Durability		8	2	2
East St. Louis, Ill.		x	..	..	x	..	..	..	x	..	x	x	..			2½	3–5	3–4
Elmira, N. Y.		x	..	..	x	..	..	..	x	..	x	x	..			¾	13	4
Akron, O.		x	..	..	x	..	..	..	x	..	x	x	..		Cracks; crumbles	5	10	10
Barberton, O.	Murphy Grout	x	..	..	x	..	..	..	x	..	x	x	..			1	6	
" " "	1 to 2 Grout	x	..	..	x	..	..	..	x	..	x	x	..			½	3	
Wilkes-Barre, Pa.		x	..	..	x	..	..	..	x	..	x	..	x			15	0–14	
Covington, Ky.		..	x	..	x	..	..	..	x	..	x	x	..			12	6	6
Indianapolis, Ind.		..	x	..	x	..	..	..	x	..	x	..	x			52	6	10
Pawtucket, R. I.		x	..	..	..	..	..	..	x	..	x	..	x				3	3
Atchison, Kan.		x	..	..	x	..	..	..	x	..	x	x	..	Easily cleaned	Poor foothold on grades	5	0–3	
Fort Wayne, Ind.		x	..	..	x	..	..	..	x	..	x	..	x			7	2–5	
Kalamazoo, Mich.		x	..	..	x	..	..	..	x	..	x	x	..		Bricks removed cannot be used again			10
Taylorville, Ill.		x	..	..	x	..	..	..	x	..	x	.	x			2		
Troy, O.		x	..	..	x	..	..	..	x	..	x	..	x			1½	1	1
South Bend, Ind.		x	..	..	x	..	..	..	x	..	x	x	..		Slippery; hard to repair	10		6 mo.
Scranton, Pa.		x	..	..	x	..	..	..	x	..	x	x	..			5½	1–15	6
Erie, Pa.		x	..	..	x	..	..	..	x	..	x	x	..			3	11–15	11–15
Birmingham, Ala.		x	..	..	x	..	..	..	x‖	..	x	x	..	Water tight	Hard to repair	3	5	5
Cambridge, Mass.		x	..	..	x	..	..	..	x	..	x	x	..	Keeps bricks tight		3½	5–10	
Meriden, Conn.		x	..	..	x	..	..	..	x	..	x	x	..					
Elizabeth, N. J.		..	x	..	x	..	..	..	x	..	x	x	..		Cracks	½	8	8
" "		..	x	..	x	..	..	..	x	..	x	..	x			2	1	1
Chillicothe, O.		x	..	..	x	..	..	..	x	x	..	..	x			2	9–10	9–10
Tiffin, O.		x	..	..	x	..	..	..	x	..	x	..	x	Keeps brick tight	Hard to repair	1	11	11
Buffalo, N. Y.		..	x	..	x	..	..	..	x	..	x	x	..	Brick can be laid close	Must stand before use; difficult to secure good const'n	20	0–15	
Phoenix, Ariz.		x	..	..	x	..	..	..	x	..	x	..	..		Cracks	1	12	12
Troy, N. Y.		..	x	..	x	..	..	..	x	..	x	..	x	Not slippery when wet		15	1–15	1–15
Campden, N. J.		..	..	..	..	..	..	..	..	..	..	..	..	Used exclusively				
Chicago, Ill.		x	..	..	x	..	..	..	x	..	x	x	..	Wears uniformly		5	5	5

SAND

La Salle, Ill.		x	..	..	x	..	..	x	..	..	x	x	..			9	8	4
South Bend, Ind.		..	..	x	..	..	x	..	x	..	x	..	x			28		10
Erie, Pa.		..	..	..	x	..	..	..	x	..	x	..	x	Easily repaired		.2	3	3
Birmingham, Ala.		..	..	x	..	..	x	..	x	..	x	..	x	None	All bad	3	7	7
Tiffin, O.		..	x	..	..	x	..	..	x	..	x	..	x	Easily repaired	Bricks get loose	7	12	12
South Omaha, Neb.	(5 streets)	x	..	..	..	..	..	..	x	..	x	x	..			4½	1–4	1–2
" " "	(2 ")	..	..	x	..	..	..	..	x	x	..	x	..			⅞	15	2
" " "	(1 ")	..	x	..	..	..	..	..	x	..	x	x	..			¾	15	2
Columbus, O.		..	x	..	x	..	..	..	x	x	..	..	x	Cheap; easily repaired				
Atchison, Kan.		..	x	..	x	..	..	..	x	x	..	..	x	Easily repaired	Unsanitary; bricks chip	22	1–20	1–20
Fort Wayne, Ind.		..	..	..	x	..	..	..	..	..	..	..	..	Satisfactory		8		5–7
Marseilles, Ill.		..	x	..	x	..	..	..	x	..	x	x	..	Bricks easily removed	Bricks chip	½	4	4
Moline, Ill.		..	x	..	x	..	..	..	x	..	x	..	x	Cheapness; easily repaired	Bricks get loose	1½	20	
Ottawa, O.		..	x	..	x	..	..	..	x	..	x	..	x		Edges chip	5	5–10	5–10
Champaign, Ill.		..	..	x	..	x	..	x	..	x	..	..	x	Easily repaired		13	1–15	4
Joliet, Ill.		..	x	..	..	x	..	..	x	..	x	..	x		" "	4	2–16	10
Harvey, Ill.		..	..	..	x	..	..	..	..	..	..	..	x			2	1	1
Conneaut, O.		..	..	x	..	..	x	x	..	x	..	..	x			½	4	4
Toledo, O.		..	..	x	..	x	..	..	x	x	..	..	x	Cheap; easy to repair	Sand washes out; bricks chip	40	15	15
Chester, W. Va.		..	..	..	..	..	..	..	..	..	..	..	..	Reported satisfactory				

Experience with this construction has not been sufficiently extended to decide as to the relative merits of the asphalt or tar treatment. Sufficient experience, however, has been had in many sections of the country to show that a mere surface treatment is but a palliative and must be applied frequently. In the case of roads sustaining very heavy motor traffic it has been found to last but a very few months. In other cases, carrying much lighter traffic, it has lasted two or three years.

Application to Residence Streets

This change in the construction of macadam roads will be productive of a better pavement and will doubtless produce a form of construction suitable for residence streets of small towns which carry but comparatively light traffic, giving a pavement at a far less cost than brick, and having the advantages of a dustless, noiseless pavement, offering a good foothold, and in appearance more in keeping with the surroundings than a brick pavement.

Experiments of the State Highway Commission and Chicago Park Boards

The State Highway Commission has constructed at Naperville sections of road composed of various materials—limestone and slag macadam, as well as gravel, also using both a heavy asphalt oil and tar for a binder. This stretch of road, about a mile and a half in length, is one of the most interesting pieces of experimental work in the State.

Perhaps the most expensive experimentation with tar and oil in this section of the State has been carried out by the Chicago Park Boards. The roads under their charge are submitted to some of the heaviest motor traffic in the country, and an attempt has been made to find some method of construction which retains the good features of a well made and well kept macadam and at the same time at not too great an increase in cost.

The reports of the Lincoln, West Side, and South Park Boards should be consulted by everyone interested in this form of construction.

Use of Oil on Earth Roads

The Illinois Highway Commission has undertaken experiments in the treatment of earth roads with oil, in an endeavor to construct a waterproof covering, sufficiently durable to withstand traffic. Two sections of road have been constructed; one on a light clay soil, and the other on a black, sticky soil. So far both sections give promise of success. It remains to be seen if the durability of the roads will warrant the cost. The treatment required about 2½ to 3 gallons per square yard, making the cost not less than 30 to 40 cents per square yard complete.

Chicago Pavement Practice

While no new paving materials have been placed on the market during the past year, the older materials have, at least, had a greater range in their use. For example, slag, which a few years ago was used only to fill streets which were below grade, is now allowed, under the specifications of the City of Chicago, to be used in making the concrete base for its pavements. The use of slag as a foundation for brick pavements has also been somewhat extended, while its use as a first course for macadam is still popular.

Brick is not a popular pavement in Chicago, being used principally in paving alleys, yet some brick streets have been laid during the past year. Brick on a slag foundation seems to give good results, but less than an 8-inch slag base should not be used. Cement grout is considered a good filler, but often streets or alleys cannot be closed to traffic long enough to allow the cement to harden and tar filler must be used instead. A small amount of asphalt filler has been used during the past year, but experience has been so limited and the time since laid so short that conclusions cannot be drawn.

Creosoted wooden blocks laid during the past year, with a sand filler, have not proved a success. The blocks heave after almost every rainstorm, and the bed sand is often washed out of place. A wood pavement, no matter how well treated, must be protected from moisture getting under the blocks, and this cannot be done when a sand filler is used. It is claimed that traffic will grind dust and sweepings into the joints, and thus make them water-tight, but there is some room for doubt as to this. Sand being a rigid material, any expansion in the blocks cannot be taken up in the filler, and the pavement is forced up off the concrete. A tar or an asphalt filler is preferable. But even with a tar filler, the blocks should not be driven too closely together nor should they be laid so loosely that traffic will fray the edges. In Chicago asphalt filler is preferred to a tar filler, on account of its not becoming so brittle in cold weather nor so soft in warm weather, also retaining its life longer than a tar filler.

A small amount of cement paving has been laid, but does not seem to withstand heavy traffic.

The street railway companies, in rehabilitating their tracks, require a large amount of granite blocks in paving their rights-of-way. This, in connection with that required by the city in paving streets and alleyways, has kept the quarries working to their full capacity. More of this kind of pavement would have been laid but for the fact that the street railway companies could not get their tracks adjusted. Cement grout filler has been tried in connection with a granite block pavement, but has not proved a success, owing to the fact that it is practically impossible to keep traffic from the pavement until the grout has time to set.

Greater efforts have been made by the city during the year just past to get better asphalt pavements than were made in any preceding year since Chicago first began laying pavements of this kind. A new set of specifications has recently been adopted, and it is hoped that better pavements will result. One of the innovations introduced under this specification is that the contractor shall furnish a certified statement, daily, of the number of loads of paving mixtures delivered on each street. This furnishes a check on the thickness of the mixtures laid.

Asphalt is still one of the most popular pavements in Chicago and the problem of repairing streets on which the guarantee has expired is already becoming impor-

tant. It is not unlikely that in the near future the city will be compelled to erect plants of its own to take care of the repairs. Asphalt machinery has been improved, and there is hardly a paving concern that does not use a concrete mixer.

In order to condense the tables on brick pavement fillers we have taken that for each material and determined the percentages of excellence in relation to the various conditions in the following way: Under the head of "Resistance to Wear," "Good" was figured as 100, "Fair" as 50, and "Bad" as 0. Under the other heads the number of no's was divided by the sum of no's and yes's, thus obtaining the percentage of those which were not unsatisfactory. This resulted in the following table:

FILLERS FOR BRICK PAVEMENTS

RELATIVE EXCELLENCE ALONG CERTAIN LINES

In resistance to wear "Good" is counted 100; "Fair," 50; "Bad", 0. In the other cases the figure represents the percentage of all replies which was favorable

KIND OF FILLER	RESISTANCE OF PAVEMENT TO WEAR UNDER		EASE OF CLEANING IN		Absence of Noise	Average	Number of Reports	Miles of Pavement
	Heavy Traffic	Light Traffic	Hot Weather	Cold Weather				
Asphalt	59	81	74	86	90	78	23	334
Tar	76	92	79	96	92	87	24	177
Cement	85	97	100	98	38	84	48	301
Sand	38	69	82	65	72	65	20	150

Since these opinions are based on about 650 miles of brick pavement in a considerable number of cities, it would seem as though the averages thus obtained represented, as accurately and fairly as it is practicable to obtain such conclusions, the relative desirability and efficiency of these various fillers. It is noticed that cement filler leads in "resistance to wear" and in "ease of cleaning," but is found quite objectionable on the score of noise. In each city the various conditions might be considered to have different relative importance; and where noiselessness was considered more important than durability or ease of cleaning, a tar or pitch filler would appear to be preferable to cement; otherwise the cement would appear to have the advantage. If we should assume equal importance to each of the various conditions we have the desirability shown in the column headed "Average."

Under the head of "Other Good and Other Bad Features," which do not offer themselves to this method of combining and averaging, we find that asphalt filler is reported from three cities as having the desirable characteristic of permitting the pavement to be removed easily; its elasticity, permitting expansion, is commended in three cities. In two cities it is said to have the bad feature of permitting the brick to get loose; in one it loses life and permits the brick to chip; in another it is slippery when cold, and one city finds it too expensive.

Tar filler is found to permit easy removal of bricks in two cities; its elasticity is commended in two others; its waterproof quality in two; its cheapness in one, and the fact that the pavement can be used 24 hours after laying in another. On the other hand, three find that it flows to the gutter in the hot weather, two find that it comes brittle and disintegrates in cold weather; one that it cannot be laid in wet weather; another that it is hard to repair and still another that it allows the bricks to get loose.

Cement grout filler is liked because of its water-tight qualities, in five cities; because it protects the edge of the brick, in two cities; because it keeps the brick tight, in three cities; because of its durability, in two cities, and in one city, because it is not slippery when wet. On the other hand, nine cities find that it cracks; eight that it is hard to repair; three that it is slippery; two that it causes expansion joints to ridge up in summer; one that the street must be closed so long before use and that it is difficult to secure good construction.

A quality of sand filler approved by nine cities is the ease of repairing the pavement; three like it for its cheapness. On the other hand, three find that the brick get loose; four that they chip; one that it is unsanitary, and one considers it all bad with no good qualities.

STREET WORK IN ROCHESTER

THE reports of the Department of Public Works, of Rochester, N. Y., are usually very complete and contain in detail a large amount of information concerning the nature and cost of work done by that city. A great deal of labor is involved in compiling the tables and preparing this information for publication; still, it would seem as though a large part of this might be kept up during the year so that the report could be published within a few months, at least, of the termination of the fiscal year. The report for the year ending December 31, 1907, did not reach this office until the middle of January, 1909, and presumably was not ready for distribution until twelve months after the expiration of the year which it covered. During this interval a large part of the value of the report, especially to its citizens, was lost through changed conditions or through the lapsing of interest in the matters therein treated of.

Perhaps the most complete information given is that concerning the paving of the streets. Asphalt pavements were first laid in Rochester in 1885, Trinidad asphalt being used. In later years various other kinds of asphalt have been used, but since 1901 nothing other than Trinidad. The earlier pavements were laid some with five-year and some with ten-year guarantees; but since 1897 all contracts have been with ten-year guarantees except one of five and one of fifteen. In 1907, 497,087 square yards were out of guarantee and being main-

tained by the city. The cost of such maintenance was 6.27 cents per square yard of total pavement. This total included 251,336 square yards of Trinidad Lake, 132,382 square yards of rock asphalt, and 113,369 square yards of Vulcanite asphalt. The cost of actual work done in 1907 was $1.89 per square yard for resurfacing, including concrete foundation, and $1.24 for resurfacing only. During the years 1904, '05 and '06, the prices for resurfacing only were $1.38, $1.28, $1.27, respectively, and for resurfacing including concrete foundation the prices were $1.98, $1.88 and $1.85. The cost of constructing new pavements in 1907 varied from $1.25 to $2.10, averaging $1.83. In 1906 the cost varied from $1.70 to $1.95, averaging $1.84; and in the previous year the price had varied from $1.60 to $2.00, averaging $1.77. The maintenance per square yard of total surface of all pavements, since the first of these went out of guarantee, has averaged per year as follows: For those maintained for 12 years, 5.96 cents; for those maintained for 11 years, 2.58 cents; 10 years, 2.96 cents; 9 years, 1.56 cents; 8 years, 1.51 cents; 7 years, 3.34 cents; 6 years, 2.06 cents; 5 years, 2.92 cents.

Medina stone block pavements on 6-inch concrete foundation, with cement grout filler, and including a ten-year guarantee, cost an average of $2.73 per square yard in 1906 and $2.81 in 1907. There were in the city 11.72 miles of this, excluding that between the tracks.

Of brick pavements there were 36.43 miles in use in the city, in addition to that laid between the tracks. This pavement is laid with a number of makes of brick, among which Johnsonburgh predominates. All were laid with cement grout filler on 6-inch concrete foundation and with ten-year guarantee. Expansion joints of pitch were used in all cases. In 1907, 10.312 miles were laid, the cost varying from $1.70 to $2.20.

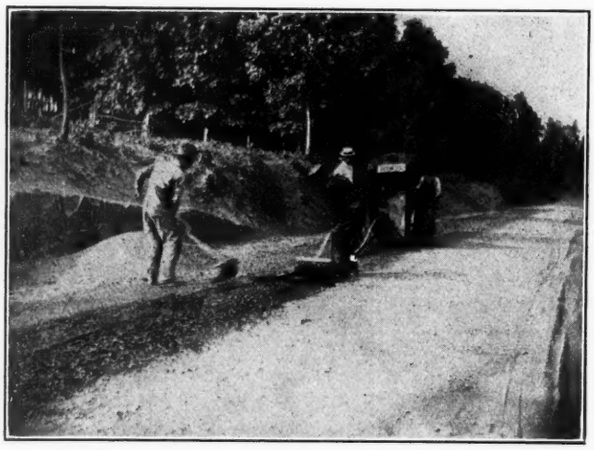
SPREADING TAR ON ROAD SURFACES

In spreading road-binding tar on macadam streets various methods have been employed, most of them simple in nature. Four of these methods are shown in the illustrations. The first shows the use of ordinary hand cans for filling with Tarvia A the top two inches of Briggs Road, Omaha, Neb. This was afterward covered with screenings and rolled to a solid surface.

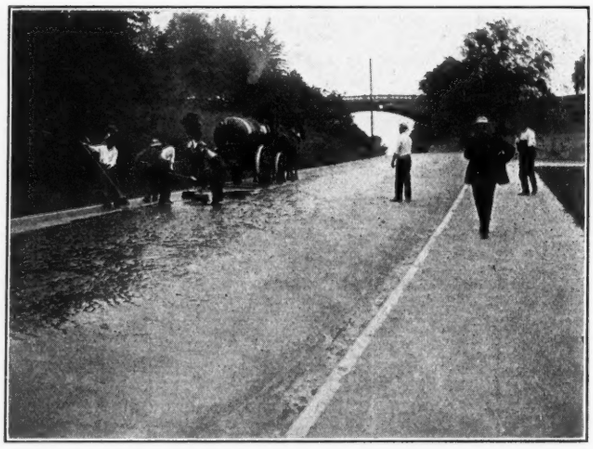
BRIGGS ROAD, OMAHA, NEB.

A small tank, from which the tar flowed onto the road by gravity through a hose, was used at Farmington, Conn. The tar was then thoroughly broomed in.

A more elaborate modification of this was used in

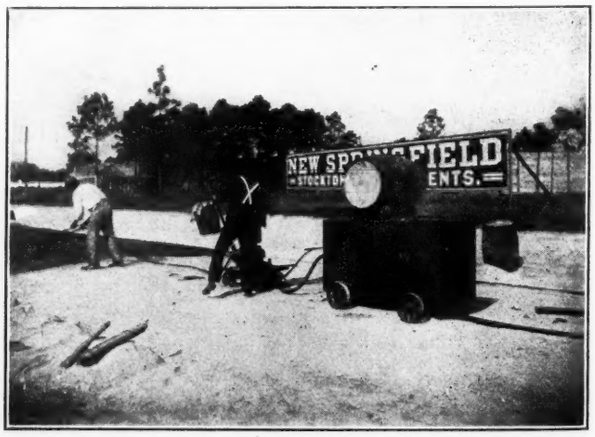


ROAD AT FARMINGTON, CONN.



ROAD IN EDEN PARK, CINCINNATI, O.

Cincinnati, O., where the tar was heated in a "fire wagon." It flowed through a vertical pipe into a horizontal one from which it was distributed through a longitudinal slot.



PUMPING TAR FROM WAGON, JACKSONVILLE, FLA.

In Jacksonville, Fla., a hand pump was used for forcing the hot tar through a hose. The tar kettle is provided with a rolling bed or carrier for the tar barrels.

PAVEMENT MAINTENANCE IN CLEVELAND

All Street Openings Repaved by Street Department — Permits Required and Work Closely Watched — Repair Department of Twelve to Sixteen Gangs — Portable Asphalt Plant — Forms and Records

By P. J. MASTERSON, Superintendent of Streets of Cleveland, O.

WITH the incoming of the present administration about eight years ago, one of the matters to receive immediate attention was that of the care of the pavements. Cleveland, like most other cities, had suffered from neglect in this respect in the past. After the expiration of the contractor's guarantee little attention was paid to the pavements in the way of repairs until they became so bad that they could no longer be tolerated; then they were relaid. This not only entailed a large expense upon the owners of abutting property, but seriously depleted the general fund of the city. When it became necessary to open up pavement for the laying of gas, sewer or water pipes, wire conduits, street car tracks, etc., the tearing up was done without proper supervision. Frequently an unnecessary amount of time was allowed to elapse before the pavement was relaid, and when done there was no certainty that the work was done in such a way as to restore the pavement to as good a condition as before the opening was made. It was determined that it was as important a function of the city government to preserve the pavements as it was to secure the laying of them in the first instance. Most of the work of relaying the pavements had up to this time been done by contract. It was now determined that better results would be secured were the Street Department to do this work directly.

Acting under an ordinance enacted in May, 1902, the department has during the past six years maintained a rigid inspection of all street openings from the beginning to the completion of the relaying of the pavement. All pavements are relaid by the department immediately on the completion of the work for which the opening was made.

When it becomes necessary to open a pavement for any purpose the individual or corporation desiring to make the opening is required to make an application to the department showing the location, kind and extent of the pavement desired to be taken up, the number, purpose and size of the openings to be made and the time when the work is to be done. A deposit is also required to cover the estimated cost of repairs for said opening. A permit is then issued and an inspector assigned to the work. The inspector is required to see that the opening is made with the least possible damage to the pavement and does not exceed the specifications set forth in the application. Immediately on the completion of the work an order is issued to the general foreman of pavement repairs to repair the opening. The results of this method are apparent.

When openings are made the pavement, instead of lying for days and weeks exposed to the destructive action of street traffic and the disintegrating effects of the weather, is repaired at once. Another result of the department doing all this work is that, because of the quantity of work involved, there are kept constantly employed throughout the season gangs of expert pavers (the best that can be secured), under the direction of foremen who thoroughly understand all of the different kinds of pavement. This insures that the pavement when relaid will comply in every respect with the specifications of the pavement as first laid, and shall be in every respect equal to it.

In addition to the above work, a constant and vigilant watch is kept on all paved streets to detect at once all holes arising from natural causes.

The repair department as now organized is under the supervision of a general foreman of paving repairs. He has under his charge during the busy season twelve to sixteen gangs of pavers. These gangs are of various sizes to take care of the different kinds of work. All openings of less than one hundred square feet are taken care of by a gang consisting of one paver, who also acts as foreman, two laborers and a horse and wagon. All openings of over one hundred square feet are turned over to gangs consisting of two pavers, one of whom acts as foreman, four laborers and one horse and wagon. For openings larger than 500 square feet, and upon streets where a considerable amount of repair work is necessary, a gang under the charge of a foreman is organized. This will frequently consist of as many as five pavers, two rammers, fifteen laborers and one team. In Cleveland the eight-hour day is enforced on all public works. Pavers get the union scale of 50 cents per hour, rammers $2.25 per day and laborers $1.75 per day.

At the beginning of the season the Superintendent of Streets arranges with the general foreman of paving repairs for a thorough inspection of all the city pavements, to determine where repairs are needed. A record is made and the order in which the work shall be done is determined. Work orders are then issued to the general foreman, one for each job, in the order determined upon. The general foreman thereupon arranges for a gang of proper size and gives the work order to the foreman if a large gang is required, or to the paver in charge of a small gang. The work order gives the location and size of the opening and such other information as the Superintendent may consider necessary. A duplicate of the order is kept at the office. The man in charge of a gang is required to enter upon the work order each day, if the work should continue for more than one day, the number of hours put in by each class of workmen, as pavers, rammers, laborers and teams, the amount of work done each day and the kind and amount of material used. As soon as the job is completed the work order is turned in at the office. The general foreman verifies the measurements and the amount of material used. The timekeeper verifies the amount of time. The cost of the job is figured and all the items are entered on the records of the department.

No. A- 2300

The City of Cleveland, O.
DEPARTMENT OF PUBLIC SERVICE
DIVISION OF STREETS

Repairs to Paved Streets.

Ordered by .....
Paving Permit No. .....
Police Report No. .....

Mr. .....Foreman.

Date .....

Charge to..... *Supt.*

ARTICLES FURNISHED	1 16	2 17	3 18	4 19	5 20	6 21	7 22	8 23	9 24	10 25	11 26	12 27	13 28	14 29	15 30	31	Total	Rate	Amount
Medina Dressed Block Stone, ft.																			
" Common " " ft																			
" Crosswalk and lin. feet																			
Sandstone and lin. feet																			
" Curbing and lin. feet																			
Medina Curbing lin. feet																			
Crushed Stone and lbs.																			
Portland Cement and Sacks																			
5 inch. Brick and No.																			
" " " "																			
Shale " " "																			
Tar in Barrels and sq. ft. filled																			
Asphalt sq. ft.																			
Lake Sand in Sacks and lbs.																			
ravement relaid and ft.																			
Asphalt,																			
Medina Block Stone																			
" Common "																			
5 inch Brick																			
4 " "																			
Crosswalk relaid and ft.																			
Curbstone reset and ft.																			
" cut " "																			
Concrete replaced and ft.																			
Foreman																			
Tamper																			
Pavers																			
Apprentice Paver																			
Rammers																			
Laborers																			
Teams																			
Horse and Wagon																			
Totals,																			

NOTE.—Should this work lapse into the last half of the month, or the following month then this order must be turned in and a new duplicate of same will be issued to you.

REMARKS:

Date completed ..... 190..... Foreman .....

Amount of Time and Rate, Correct .....

Amount of Material and Charge for same, Correct .....

Posted.....

Entered.....

Police Report No.....

Ordered by.....

THE CITY OF CLEVELAND, O.
DEP'T OF PUBLIC SERVICE
DIVISION OF STREETS

FILLING AND GRADING
DIRT STREETS
GENERAL ORDER No. A21300

DATED.....

MR.....

	Total Hours	Rate	Amount		Material		Slag	Cinders	Lumber and feet	Spikes 40 d	Nails 20 d
Inspector											
Time Keeper											
Foreman											
Machineman											
Carpenter											
Asst. Carpenter											
Laborers											
Teams											
Single Rigs											

NOTE.—Should this work lapse into the last half of the month or the following month, then this order must be turned in and a duplicate of same will be issued to you.

Completed ..... 190 ..... at cost of $.....

Charged to .....

Signed .....
Superintendent.

Per .....

Back of Order Blank, of which Other Form on This Page Is the Front

Date	Foreman	Asst. Foreman	Carpenter	Asst. Carpenter	Laborer	Team	Single Rig	

Amount of Time Correct

Amount of Material and Price Correct

As there are two pay days in a month, if a job should run over either the 15th or the last day of a month, the work order must be turned in and a duplicate is issued for the following half-month. In this way the amount of work done in each half-month is known, the pay-roll can be verified by the amount of time on the work orders, and the average cost of the work can be found. The Superintendent thus has a constant oversight over the amount of work done and cost of same and can detect at once any lack of efficiency in the organization or any part of it.

The cost of repair work necessarily varies with the size of the opening and the kind of pavement. Where the opening is occasioned by the laying of gas or water pipe or conduits and involves the relaying of a mile or more of pavement over a trench, it can be laid very cheaply. Where the holes are small and scattered and considerable time is lost in going from job to job, the cost increases. Cement filled pavements, especially brick, are costly to repair on account of the time required and the difficulty in cutting the joints. Frequently where the pavement has a great many small holes it is found advisable, in order to save expense, to take out and relay an entire section of pavement rather than to attempt to fill the small holes. The average cost of relaying pavement, taking and averaging a year's work, we find to be about as follows:

Medina dressed block, tar filled	10.45	cents	per	sq. ft.
Common Medina, sand filled	6.85	"	"	"
Medina dressed block, cement filled	11.57	"	"	"
5-in. brick, tar filled	9.59	"	"	"
5-in. brick, cement filled	13.4	"	"	"
4-in. shale brick, tar filled	9.13	"	"	"
Asphalt, including material	9.5	"	"	"

The repairing of asphalt pavement was taken up for the first time in 1906 as an experiment. Previous to this time the Department had not been prepared to take care of this work, and contractors took advantage of this fact to make their repairs when it best suited their convenience. Frequently during the busy months they would have all their machines out of the city at points where they had contracts for laying pavement, and the repairs here would have to wait until the outside work was done and the machines were returned to the city. Often six months would elapse before necessary repairs were made.

Complaints from this source became so frequent and annoying that it was decided that the city ought to own an asphalt machine and so be in a position to attend to repairs itself. By so doing the Department would not only be able to make repairs in pavements where the guarantee expired, but in the case of guaranteed pavements the contracts empowered the city, after due notice, to make repairs if contractors failed to do so.

Accordingly a small asphalt heater was ordered at a cost of $500 complete, including the necessary tools and a roller. The asphalt is bought ready mixed and hence only requires to be reheated. Old material (asphalt) that has once been on the street may, if it is sufficiently sound, be reheated and used over again in repairing pavements.

As the capacity of the little asphalt heater is only 48 to 56 square yards per day if laid 2 inches thick, and but 36 to 42 square yards per day laid 2 to 2½ inches thick, its chief use is in taking care of the little holes in the pavement on account of sewer and water connections. For this purpose it has, in the short time it has been in use, fully justified the purchase. It has answered the requirements so far, but as within the next year or two the guarantee will expire on several miles more of asphalt pavement, the arranging for a larger and more complete asphalt equipment is becoming a pressing necessity. The results obtained with the small heater certainly would tend to justify the continuing of the experiment on a larger scale.

We feel that the results have demonstrated the wisdom of the city doing all the work of repairs to pavements directly. Even with the shorter working day and the wages paid to labor, the cost has been largely reduced.

While the saving in dollars and cents arising from the city doing its own repair work is an important item, it is by no means the sum of all the benefit to the community. One of the most important results of this policy is that all repairs are made at once when needed. Let a break or hole appear in the pavement, and the wear of traffic and action of the weather, etc., cause a rapid disintegration around the break. A street that is not repaired promptly, but in which the pavement is allowed to get full of holes, will soon get into a condition where nothing but a complete resurfacing will restore it. The cost of laying new pavement is great and nothing should be left undone that will tend to preserve and prolong the life of pavement when laid. Pavements laid over twenty-five years ago are today in good condition owing to the promptness with which repairs are made. Furthermore, this system assures the relaying of all pavement according to the specifications by which the pavement was first laid, and thus restores it to a condition almost as good as the original pavement. The life of the pavement may be greatly prolonged if all necessary openings and holes arising from wear and action of the elements are taken care of at once and relaid with a good material and in as careful a manner as was the original pavement. Next in importance to securing the best pavements in the first instance, is proper care to preserve them when laid.

Owing to the general business depression and other causes, the amount of work done by the Department during the year 1908 was not up to the usual average. However, there was relaid

199,279	square	feet	of	Medina	dressed block, tar filled
13,133	"	"	"	"	dressed block, cement filled
155,693	"	"	"	"	common, sand filled
27,920	"	"	"	brick,	tar filled
97,577	"	"	"	brick,	cement filled
43,960	"	"	"	4-in.	shale brick
6,115	"	"	"	concrete	replaced
41,658	"	"	"	asphalt	
2,529	"	"	"	tar	macadam
587,864	square	feet	of	total	pavement

STREET REPAIRING IN GRAND RAPIDS, MICH.

Method of Keeping Track of and Recording All Materials and Labor Used—Accurate Account Kept of the Cost of Each Job—Apparatus Employed—Cost per Square Yard of Repairs

By L. W. ANDERSON, City Engineer

Up to the beginning of the present municipal year, street repair work has been under the control of the Common Council. Ward funds are raised in the annual budget, which covers not only repairs but sprinkling, cleaning and miscellaneous expenses. The work is now under the charge of the Board of Public Works and directly in charge of the Engineering Department. Under the charter the funds are still divided between the wards, but the Council has only the fixing of the amount in the annual budget for each ward.

Preliminary to taking up the work, we devised a system of accounts to provide for both this street repair work and the replacing of streets where openings were made by plumbers and corporations. The work is in charge of a superintendent, who has a time-keeper and store-keeper at the yard. The stock record card shows the manner of carrying the amount of stock for each item. The material is checked out and receipted for by the teamster or foreman receiving the material on the street.

Daily reports are made on each job and a sketch showing the dimensions and location of the work is shown on the back. Form "D" is used for this purpose.

(See next page for this and time-keeper's Daily Report.)

Reports from the various foremen are consolidated on the time-keeper's daily report made to the Accounting Department. From this the pay rolls are prepared. The totals for these are consolidated with a monthly report of ward repairs, one sheet being used for each ward. This gives the cost of labor and material and the number of yards of the various kinds of pavement repaired. A list of the various street improvements made in the past on the various streets and sections of streets is arranged alphabetically, and a number given to each section as improved. Cards 5 x 8 inches were prepared showing all essential data on the cost of the original improvement, character of improvement, etc.; also a space for itemizing cost of repairs. This, if kept up, in the course of years should furnish a very good estimate of the cost of repairs on the various classes of improvements.

Our asphalt repairs are made by a small Hooke repair plant. The city has six road rollers, which do all contract rolling, and are also used for street repair work on gravel, macadam and pavements. All openings in pavements are allowed to settle and are then rolled with an eight-ton tandem roller previous to excavating for replacing pavement.

FORM 500 1908

STOCK RECORD

Record of ..... Basis of Count .....

RECEIVED. No. ..... DISBURSED.

DATE	FROM WHOM	QUANTITY	PRICE	FRT.	CRTG.	LABOR	TOTAL	ITEM COST	ITEM CHGE	DATE	TO WHOM	QUANTITY	ON HAND

..... From ....., To .....

ITEM	COST	%		DATE	REPAIR EXPENSE												MISC.	TOTALS		
					PAVEMENT			CURB			GUTTERS			CROSS WALK						
					YDS	LABOR	MAT	FEET	LABOR	MAT	YDS	LABOR	MAT	YDS	LABOR	MAT		DAY	YEAR	TO YEAR
Pd. Cont.			Cont. awarded																	
Incid'ls			Final acc't																	
Rollg & Water			Guaranty expires																	
Engrg			Improvement																	
Insp'n			Length																	
Print'g			Sq. yards																	
Assmt			Assmt—Intersect'ns																	
Total,			Assmt—G.R.St.Ry Co.																	
			Assmt—Property																	
			Assmt—per ft. front																	
			Brick used																	
			Filler used																	
			Curb used																	
			Foundation																	

RECORD CARD OF STREET REPAIRS

No. D 3745

Board of Public Works, Engineering Department

Daily Report of Street Repairs_____ 19____

Street Repair Fund_____ Street. No.____, _____ Ward

Street Opening Fund_____ Permit____, _____ Street

Fund, Plumber or Corporation

Materials

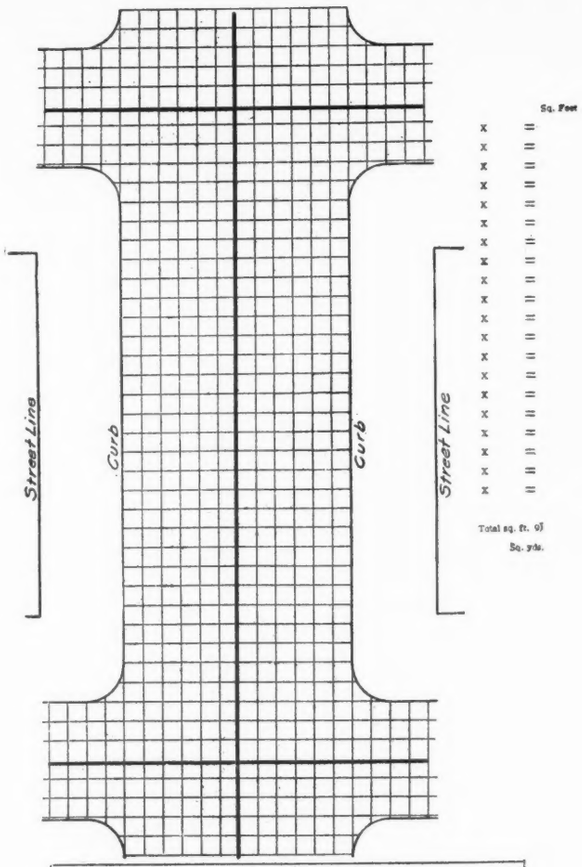
KIND		Rec'd	Ret'd	For Nos. on Back			Total	Rate	Cost	
Asphalt Cement	gals.									
Flux Oil	gals.									
Asphalt Sand										
Binder Gravel										
Portland Cement Filler	sacks									
Portland Cement Concrete	sacks									
Natural Cement Filler	sacks									
Gravel, screened	cu. yds.									
Gravel, bank	cu. yds.									
Sand, concrete	cu. yds.									
Asphalt, block	number									
Brick, No. 1 pavers	number									
Brick, No. 2 pavers	number									
Brick, Common	number									
Creosoted Wood Blocks	sq. yds.									
Medina Stone Blocks	sq. yds.									
Broken Stone	cu. yds.									
Stone dust	cu. yds.									
Asphalt Filler	lbs.									
Coal Tar Filler	lbs.									
Coal	lbs.									
Wood	cds.									
Sprinkler										
Car fare										

Labor

KIND	NAMES	Stock Labor	Rolling	For Nos. on back			Hours	Rate	Cost	
Supt.										
Time-keeper										
Waterboys										
Foreman										
Paver										
Watchman										
Team and man										
Cart and man										
Laborer										
Laborer										
Laborer										
Laborer										
Laborer										
Laborer										

Signed_____

Foreman



Total Cost of Labor and Materials

	Quantity	Cost Total	Cost Item	
1 (a) Sheet asphalt top				
1 (b) Sheet asphalt binder				
2 Block paving				
3 Brick paving				
4 Creosoted block paving				
5 Bituminous macadam				
6 Macadam				
7 Gravel				
8 Concrete				
9 Curb				
10 Gutter				
11 Crosswalks				
12 Concrete foundation				
13 Sidewalk repair				
14				
15				

Signed_____

Timekeeper

Form D. Daily Report

Reports for each job are made on a card, of which the front is reproduced above; the diagram at the right being found on the back of said card, and used for indicating the exact location of the work.

No. D 401

Time-keeper's Daily Report

OF MATERIALS RECEIVED AND DISBURSED

Street Repair Stock Date_____

Received				Disbursed																
					Street Opening Fund			Street Repair Fund												
MATERIALS	QUANTITY	FROM WHOM	Cost Price	Materials	Amt.	Charge Price	Total	Amt.	Charge Price	Total	Amt.	Charge Price	Total	Amt.	Charge Price	Total	Amt.	Charge Price	Total	

The cost of the various repairs during the past year have been as follows:

	Per Sq. Yard.
Sheet asphalt	$ .77
Block asphalt	1.92
Brick	.95
Gravel	.08
Macadam	.13

The greatest part of the repair work was devoted to asphalt and gravel; only the worst holes were repaired on brick streets. The repairs as made by the Common Council have been very limited in the past, and especially the gravel streets were allowed to become in very poor condition. The total amount of repairs has been about $11,500.

_____WARD

MONTHLY REPORT OF WARD REPAIRS

DATE	1 SHEET ASPHALT				2 BLOCK ASPHALT				9 CURB				10 GUTTERS				11 CROSS-WALKS				12 CONCRETE FOUNDATIONS				ROLLER		USE of SPRINKLER			SALES TO REPAIR FUND			
	Da.	Yds.	Labor	Mat.	Yds.	Labor	Mat.		Lin. feet	Labor	Mat.		Yds	Labor	Mat.		Yds.	Labor	Mat.		Yds.	Labor	Mat.		Hrs.	Cost	Hrs.	Cost	10% Incid'ls			Labor	Stock	Tools
	1																															
	2																															
	3																															
	4																															
	5																															
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	29																															
	30																															
	31																															

This table also contains columns as follows:

3. Brick.
4. Creosoted Wood Blocks.
5. Bituminous Macadam.
6. Macadam.
7. Gravel.
8. Concrete.

FORM FOR MONTHLY REPORT, GRAND RAPIDS

PAVING IN POUGHKEEPSIE

All Street Work by Day Labor — Brick Paving Methods and Detailed Costs — Hand Sweeping and Flushing — Engineering Department

DURING 1908 the Board of Public Works of Poughkeepsie, N. Y., carried on all its street improvements by day's labor, and in his report on the same to the Common Council, Superintendent Robert J. Harding states that he believes that this method of doing the work has proved to be a success. The only paving done during the year was with vitrified brick, although some macadam was laid and several streets were treated with Tarvia. The cost of treating one of the streets 3,600 square yards in area is given in detail, the report showing the labor for this to have cost $82.74, the tar $102 and the screenings $94; this being equivalent to a cost of 7.7 cents per square yard. The road was thoroughly swept and hot Tarvia applied, which was then covered with a coating of screened ½-inch screenings and rolled.

The brick paving was laid according to the methods recommended by the National Paving Brick Manufacturers' Association; a 6-inch concrete base being employed with 2-inch sand cushion and cement grout filler. For brick 4-inch Metropolitan pavers were used; which were required to show not to exceed 18 per cent. abrasion and 2 per cent. absorption, and which were tested by J. W. Howard, of New York, and found to fully meet the specifications. Tar pitch expansion joints one inch thick were placed along each curb and ¼-inch joints for five successive transverse joints every forty feet. One job of 673.3 square yards of this pavement, together with resetting the curbs, cost $2.67 per square yard. The cost of complete pavement, including setting curbs, in a job of a little under 13,000 square yards, cost $2.23 per square yard. Of this sum labor and teams, including setting of curb, cost $7,930; cement at $1.35 a barrel cost $1,858; stone at $1.33 a cubic yard cost $1,334, and sand and gravel cost $1,262; tar cost $231; testing brick $70; coal $24.50; lumber $146.75. The remaining small amount was for miscellaneous expenses. Replacing asphalt blocks with brick on old foundation, on an area of 4,000 square yards, cost $1.60 per square yard.

Attention is called to the fact that it is practically impossible to keep the paved streets clean on account of the large area of dirt and macadam roads as compared with the permanent pavements; every vehicle passing from the former to the latter carrying mud or dust with it and dumping them upon the pavement. The most practical solution seems to be to prevent the formation of mud or dust on any streets in the business part of the city. The superintendent does "not think that any method of cleaning pavements is as satisfactory as flushing, supplemented by hand sweeping," but he believes, "that flushing on any pavement except one of stone or brick with cement-filled joints is destructive." In Poughkeepsie the paved streets were swept by hand daily during last year and the efforts of the employees were "faithful but ineffective." The hand sweeping was supplemented by flushing through hose at intervals. The unsatisfactory results of the efforts at cleaning were due to the reason just referred to and also to the large amount of construction work being done during the year.

The city's repair outfit made 168 square yards of sheet asphalt repairs at a cost of $221.21, or $1.31 per square yard. This included seven barrels of asphalt at $8.32, seven cubic yards of sand at $1.50, 14 bags of cement costing $7, cartage costing $14.07, wood and coal costing $11.50 and labor costing $119.27.

The Engineering Department has apparently been doing good work during the year in completing the records of the department. It completed a contour map of the entire city which showed the sewerage system, with its details. A map of the water distribution system was made showing the location and sizes of all mains and appurtenances. Sectional maps of the city are now being prepared giving the location of all underground structures. All maps and records have been filed in sectional map cases and indexed on the card system. A standard size of sheet has been adopted for drawings and many old profiles have been changed to this standard. Such systematizing of records and of work should be the rule in every city engineer's office, but we fear it is in reality more nearly the exception.

TESTING ASPHALT—MELTING POINT AND FLOW POINT

Melting Point and Penetration Vary Ununiformly—Former Valuable for Some Purposes, but Not for Paving—Apparatus for Ascertaining Melting Point—Direction in Which Investigation Is Needed

By HARRY TIPPER

The last article on this subject dealt with the consideration of the different methods of making melting point tests and the diversity of such methods, together with the want of accuracy in a number of methods at present employed. It is proposed in this article to consider the question of the practical value of the melting point test with reference to the different uses for which asphaltic material may be commercially valuable, and in this connection it will be necessary to consider the conditions under which the material is used for these various purposes.

It is necessary that asphaltic material used in paving should be able to withstand extremely high temperature in the summer time without undue softening, since, if the material softens unduly the pavement will be broken up or moved by the traffic and present an uneven surface, with all the possibilities of increasing deterioration. It is necessary, therefore, for paving conditions that action of the asphaltic bitumen under high paving temperatures should be considered and understood. For the most part this is accomplished under present conditions by taking the penetration test at 115°F. Such a test, properly taken, shows the increase in softness of the material at high temperatures and will give a very close and accurate idea of the character of the bitumen in relation to its stability under high temperature paving conditions.

Considering the value of the melting point test in this connection, it appears that the melting points of several asphaltic bitumens do not bear the same relation to each other as the penetration tests of the same asphalts at 115°. If standard asphalts be taken which, by the same tests under similar conditions, show a melting point of within two or three degrees of same temperature, it does not follow that these same asphalts will show a similar penetration curve from 32° to 115°. Two different asphalts melting at 180° will frequently show a difference in penetration at 115° of 30 to 50 per cent, making it certain that the adoption of a melting point of 180° would have no value as an indication of the action of the asphalt under paving conditions at a high paving temperature.

Samples of five different asphalts whose melting points, taken by the same method and the same operator, were not found to vary more than four degrees each way, showed a variation in penetration so great as to be out of all proportion to the difference in melting point. Such asphalts, while they would all meet the same melting point specification, would display totally different degrees of softness under penetration machine at a temperature of say 100° F. From these considerations it would seem that for paving purposes the melting point specification is entirely valueless for giving any indication of the action of the material under practical conditions.

There are, however, purposes for which asphaltic bitumen is used for which it is necessary to have an idea of the melting point of the material. For the saturation of felt and the impregnating of other fabrics with asphaltic bitumen for roofing, waterproofing and similar purposes, one of the most important considerations in the value of the asphaltic bitumen for these purposes is the temperature at which it becomes thoroughly fluid and easily taken up by the fabric, since this affects the expense of production and the ease with which the material is saturated. Under these circumstances it is an advantage to know at what point the material begins to liquefy, so that the temperature which is necessary to secure thorough fluidity and easy penetration is arrived at. Assuming the other conditions and characteristics to be similar, it is evident that the material which melts at the lowest temperature will become thoroughly fluid at the lowest temperature and will, consequently, be capable of use with less heat and less expense of production than material requiring a higher temperature. For this purpose, therefore, the melting point test, if made after some standardized method of which the value in comparison is thoroughly understood, would be indicative of one of the characteristics of the material affecting its value from a commercial standpoint.

There are many other waterproofing propositions where an asphaltic bitumen is used without admixture of any mineral aggregate and either with or without reenforcements of felt or other fabric. It is frequently necessary to know approximately the temperature at which the material will soften sufficiently to move from a vertical or inclined surface. In this case it is necessary to have some point ascertained, the value of which shall be thoroughly understood and which will demonstrate either the actual point at which the material begins to move or flow, or the point at which it begins to liquefy. For this purpose, however, it would be better to use a flow point test properly modified, such as will be specifically mentioned further along in the article, as this test would show the limit of conditions under which the material could be used, while the melting point test specifies a point which in itself does not describe the limits of conditions, but merely an empirical point above the practical limit from which the limitations in the use of the material can be approximately deduced.

For electrical purposes where an asphaltic bitumen is used, either in combination with other materials or without compounding, for the insulating of appliances where the insulation may be subjected to different temperatures under the conditions of practical work, it is very necessary for the melting point to be ascertained in order to know the limits of practical application of the material. This is particularly true of impregnating compounds used in connection with cable and armature

and with other wound insulation reenforced with fabric.

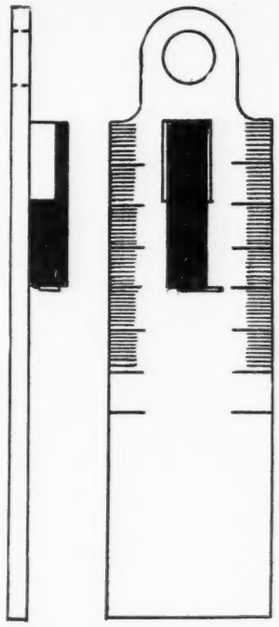
For the most part the necessities of actual practice in the use of the asphaltic bitumen for most commercial purposes for which it is at present applicable, have developed a necessity for a knowledge not so much of a so-called melting point, or point at which the material begins to liquefy, as of a point at which the material becomes soft enough to move readily in such a manner as to render it too unstable for any practical use. Whatever interest may be had in the melting point of an asphaltic bitumen is more largely from the point of view of the chemist than as a question of practical value concerning the commercial application of the material. For many commercial purposes it is more desirable to obtain a test which will demonstrate the point at which the material begins to flow under given conditions of both temperature, time and other considerations. This point will, therefore, be considered in this article and the suggestion made as to the securing of an accurate comparative determination on both the melting point and flow point test.

Flow Point

In the consideration of the point at which a material becomes too unstable to be of any value for practical purposes, thereby ascertaining the limit of temperature under which it can be considered possible to use the material, the engineer is confronted with the same difficulty as in the case of ascertaining the melting point.

The flow test given by Mr. Clifford Richardson in his "Modern Asphalt Pavement" is stated as merely a rough comparative test of the extent of flow through a certain time at a certain temperature. This is in no way an expression of the point at which the material begins to move from a definitely stable shape and position, and is consequently of no value for the present purpose. It is merely a very rough method of finding the comparative softness of different asphaltic materials at the same temperature, a point which can be more accurately ascertained within practical limits by the use of a penetrometer. Under this test there can be no comparison between one bitumen and another as to the relative points at which they will begin to move. In fact, the writer has not seen any test evolved up to the present time which will accurately ascertain such point. As has been said, there are difficulties in getting any accurate estimate of such a point similar to those which confront the engineer in considering the melting point. The action of two asphaltic bitumens may vary under ordinary conditions within such wide limits that it is questionable whether a test which would have for its object the ascertaining of the flow point would sufficiently allow for the wide variations in the characteristics of different bitumens.

In investigating this question the writer made some preliminary experiments bearing on this particular subject, taking samples of different asphaltic bitumens, all intended for the same purpose. In this test sections of the bitumen were molded, having one-quarter inch cross section and a length of one inch, and subjected to a temperature increasing from the normal at the rate of 5° per minute. The flow point was taken as that temperature at which any elongation of the section took place. In taking this point the sections were placed vertically on a graduated scale in such a manner that a very slight movement of the material could be observed. Under these conditions the flow point of the various asphaltic bitumens tested varied from 130° to 180°.



From this test it would apparently be correct to suppose that any of these bitumens would be sufficiently stable for that particular work, as the temperature would not reach the flow point by something like 40° to 60° under the actual conditions of work. This was not, however, entirely borne out in testing the material under normal conditions. Small cubes of the different materials were left at average temperatures adhering to plates hung in vertical position, the temperature of the room varying from 60° to 80°. Under these conditions the samples showed somewhat different results from those shown in the test for flow point. A sample flowing at 130° moved at normal temperatures sufficiently to lose all semblance to its original cube shape in less than 48 hours, while samples of other materials, flowing at from 20° to 30° higher temperature, showed little or no change of shape in the same time under the same conditions of average temperature changes.

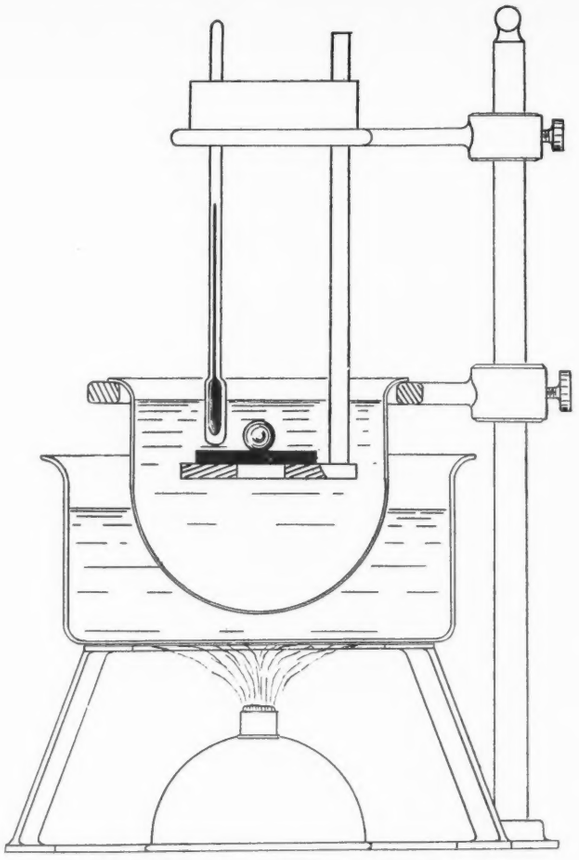
It is evident from this test that some of the bitumens which flowed at lower temperatures in the first test were really moving slightly at temperatures considerably below the point of observation, the movement being entirely too slow, up to that point, to enable it to be observed or recorded in any way. It was noted, however, in this connection, that the bitumens which showed the lower flow points and the tendency to lose shape under normal temperatures slowly, had a very ununiform penetration curve, that is, a rapid increase from brittleness to great softness in consistency under the penetration test; while the bitumens which retained their shape under normal conditions showed a more uniform penetration curve in passing from low to high temperatures. For practical purposes it is possible to get from the flow point test, conducted in such a manner that the rise in temperature is slow and uniform, a very accurate idea of the action of the asphaltic bitumen under extreme conditions. As to its action under normal conditions, the results are not so accurate and cannot be so well depended upon.

In regard to the desirable and necessary consistency of asphaltic bitumen for various purposes and its action under varying temperatures, it is evident that neither

melting point nor flow test will satisfactorily reveal the action of a material under conditions differing from those of the actual test. This means that the value of these tests for practical purposes depends upon the accuracy with which such conditions are imitated in the laboratory tests. The melting point test cannot be used in any way for learning the action of the material under normal conditions, as the variation between the melting point and the point at which the material becomes too soft in consistency for use is very large and cannot, therefore, be deduced from the melting point with any degree of accuracy. Where it is necessary to know the melting point of a material in order to ascertain the temperature required for using it in a fluid state, and the consequent arrangements to be figured on for the use of the material, the melting point test is absolutely necessary. Where, however, it is used only in connection with the question of the consistency of the material in solid form it is, as shown by many tests, evidently of no value and altogether superfluous. Late specifications for bituminous macadam material, as used in a number of cities, have called for a certain penetration at different temperatures and in addition to this a certain melting point. It is evident that the melting point test in this connection is utterly unnecessary, as the requirements are met from a practical paving standpoint if the material comes within the required penetration test. Where it is necessary to accurately ascertain the comparative melting points in a manner which will admit of minimum variation as between one test and another, the writer suggests the following test, made with the apparatus shown in the illustration:

Melt a piece of the asphalt whose melting point it is desired to know, the piece to be circular, 1¼ inch in diameter and ⅛ inch thick. Place this melted piece of asphalt on the support shown in the illustration and suspend it, together with a thermometer, in a glass beaker which is in turn suspended in another beaker and an oil bath. A brass ball ¼ inch in diameter and covered with an amalgam of mercury, so that it will not stick to the asphalt, is placed on the molded piece in its center. The support on which the piece to be tested rests has a hole in the center, and as the temperature rises the point at which the ball of brass will fall through the asphalt is taken as the melting point of the material. This method of securing the melting point is subject to very small variation and if the weight of the ball be constant, and the test pieces carefully molded, the variation is slight enough to be entirely negligible.

Whatever system of melting point test be adopted, it is evident that some method should come into general use among engineers and chemists and be properly standardized, so that the naming of a melting point or the requirement of a melting point in any specification will be thoroughly understood to mean the point as determined by such a standard test; and such a test should be of such accuracy that a variation between the tests of different operators will be slight enough to be negligible. It is only in this way that the proper and necessary requirements of the engineer can be intelligently



APPARATUS FOR ASCERTAINING MELTING POINT

fulfilled by the producer, and in such a manner that (after he has himself tested a material to come within the required specifications) there will be no cause for such a variation in result between his own and the user's test as would cause confusion and rejection of the product.

The practice of specifying a certain melting point where such requirement does not have any value as a practical consideration in connection with the use which is proposed to be made of it, is a confusion of the issues and is to be deprecated.

It would be to the benefit of both the user and producer if all requirements of this character, where they serve no practical purpose, were eliminated from the specifications and the tests confined to those which definitely govern the action of the material under practical conditions.

The flow point tests referred to above were made merely as a preliminary investigation of the possibilities of such a test and are mentioned only as a consideration of such investigation. Up to the present these tests have been found to be not entirely satisfactory, and in order to secure results which would express the value of such characteristics in practical work more accurately some modification of them would be necessary before the test would have any value or interest for the engineer. It has been referred to in this article mainly to illustrate the differences in action of different asphaltic bitumens and the absence of any thoroughly correlated method of testing these bitumens in such a manner as to

show the relation between the results of one test and the action under another.

In all the testing of asphaltic bitumens generally in use among engineers for paving and other purposes, very little attempt seems to have been made to understand the relation between the penetration curve and the flow and melting points, between the ductility curve and penetration curve; or to learn the way in which any single characteristic of the asphaltic bitumen affects another, and in what proportion. Until these points are more thoroughly investigated and understood it is evident that the tests which the asphaltic bitumen is required to meet in order to agree with any specifications will be inadequate to express the value of the material from a practical standpoint, and the limitations which may be prescribed in such a specification will be entirely empirical and may at any time work a hardship on some valuable product.

THE NEW PRACTICE IN ROAD CONSTRUCTION

Ordinary Macadam No Longer an Efficient Road—Some Binding Medium Desirable, Probably Oil, Tar or Asphalt—Methods and Cost of Applying—Economy in Balancing First Cost and Maintenance

By JAMES OWEN, Consulting Engineer

WHILE it is practically conceded that the old type of road construction, whether of telford or macadam, is not adapted to present requirements, the adoption of new methods and new practices has been taken up very slowly and the progress that has been made has been on experimental lines, from which experiments certain facts can be deduced tending to crystallize the practice into some definite form.

In no branch of engineering or municipal development has existing practice been so rudely shattered as in highway construction. The experience of the past eighty years, with the incidental expenditure of vast sums of money, seems to have been practically of no avail except as a transition condition between primeval mud and the ideal pavement of the future. The enormous amount of research and investigation into the use of proper road materials under the old régime now seems to be useless, and yet, looking back for the last forty years, it may seem that all was not in vain. The data collected, the experience of climatic conditions, the knowledge of the ability of certain materials to do certain work—all will be available and will greatly help toward reaching a definite practice in the future. As practically all highway work of the country is under State, county or municipal control, the question first arises to those in authority, Shall the practice be changed? And if the practice is to be changed, what is to be done? This question also comes up with great force in connection with repairs. Many communities under the old régime had installed a complete system of maintenance. If the new idea is adopted the old system will be for naught. The most important question will then arise, How much is the new system going to cost? Can we afford it, and will it pay? The education of the different communities into an acceptance of the new methods is, of course, dependent on the results arrived at by the bolder and more progressive localities, and it is therefore important that as much publicity as possible should be given to all efforts and trials made under the improved system, so that an absolutely defined practice may be quickly arrived at.

Concisely stated, the old practice of road building was to take broken stone of varying size, leveled or spread upon the aboriginal earth, consolidated by travel or a roller, and held together by water or moisture as a binding material. When the weather got too dry the broken stone raveled loose and was only restored by the application of more moisture from either the clouds or the sprinkling cart. If, on the other hand, there was too much moisture, the road rotted and disintegrated. All these conditions have been known to road men and were discounted by watchfulness and constant battling with the disintegrating influences, and fair average success was obtained in maintaining good surface for a large percentage of the time. But this was possible only by increasing watchfulness and care, working continuously, incessant superintendence and a constantly increasing expenditure for repairs.

The creation and maintenance of a good surface on a highway of course stimulates travel, and with the advent of the automobile came the admission of the practical failure of the old methods. The knowledge of the bonding capacity of water or moisture on broken stone under favorable conditions and an appreciation of its failure in arid climates led to the substitution of oil, which proved efficacious. This was first attempted in Africa by the French engineers over twenty years ago. By the use of oil a resilient surface was obtained. The development of resilient street pavements made with asphalt and tar, and their success when properly built, seem to have guided all new investigators and improvers into the use of the three materials—oil, tar and asphalt—and at the present time investigations of a general character have so far been limited to these three. There are, however, a number of other materials which are now being considered, but it is questionable if success will follow their use even if the output could be made of sufficient magnitude.

Taking oil, tar and asphalt as our binding mediums, the next question is, How should they be applied? And another factor here enters and especially applies to automobile travel. The old-fashioned loaded wagon, with its iron or steel tires, in passing over the road ground the surface stone into dust, and ensuing winds or rains washed or blew it off. The automobile tire acts differently, its movement tending to disintegrate the road itself. To arrest this disintegration is of prime importance, and it is a matter of grave consideration

whether mere surface sprinkling is of permanent good. As a dust preventive the oil is of undoubted value.

The question, however, is whether in new construction it would be wise to build a new road in the old method and use dust preventives in its permanent maintenance. Experience so far seems to debar such practice entirely. Therefore in new construction the two available media are asphalt and tar, and their application to highway construction with proper economical results, and at such sufficiently low cost as to enable thousands of miles to be built, is the desideratum of the hour.

Neither of these media is new. Asphalt has been used for fifty years, and the writer had charge of long stretches of tar pavement in 1867, some of which are still extant. This shows that neither are experimental. And yet the trouble with both these materials is what may be called their eccentricity. In one city you may find asphalt pavements in various conditions of usefulness, some perfect, some with holes, some disintegrated; while in another you may find all its streets in good shape. Tar pavements also have suffered in their reputation from the same cause—good in many cases, but here and there with the surface disintegrated. A granite block pavement possesses a constant characteristic—it is consistent and permanent even in its imperfections; it is popular with communities and taxpayers, since they know what they are getting and what they are going to have. This brings us to the main issue in the road question, and that is, sureness of results; and this sureness of result is absolutely dependent upon the reliability of the medium. Can this reliability be obtained and maintained? Engineeringly the answer should be yes, but technically it is in the province of the chemist to make a final determination. To that end the road engineer of up-to-date requirements must first establish a proper analytical standard of his medium. If in its use difficulties arise, modifications suggested by experience can be made. Comparisons with other practices would be advantageous, and by that means a final crystallization arrived at.

The next question arising in the use of the new media is the form of construction and character of basic material, and at this stage we are confronted with recent practice that is practically revolutionary. It may be conceded that with an accepted binding material the stone used is of secondary importance, and the local stone can be made available, even if formerly condemned. But when recent constructions using crude earth mixed with liquid asphalt show stability and permanence, it can be argued with force that the medium is of primary and the material of secondary importance. Further experience may confirm or dispel this assumption, but conservative engineers at present will not assume extremes. There is no doubt in the writer's mind that in localities with favorable climate, sand, gravel and shale mixed with liquid asphalt can be used with success. This style of road also brings into question the old accepted ideas of form of construction. Experience dictated that certain climatic, topographical and industrial conditions demanded certain specific character of construction, and the rules for such construction have been generally accepted by highway engineers with variations in detail. In practice can a uniform construction be adopted? Taking the rainless regions of the west, the supersaturated lands of Louisiana, the black soil of Illinois, the mud of the southern states and the deep frost penetration of the north—can one class of specifications be made suitable for all? Will the construction of a 10 per cent grade in the Rockies be the same as for the flat grades of southern Michigan? The future may reveal such a practice, but it is safe to say for the present that the best results can be obtained by adopting the present practice in its entirety and incorporating into the specifications and construction the requirements and use of the desired medium.

It is not the province of an engineer in a public journal to dilate on the merits or demerits of any specific pavement, whether patented or not. It is, however, his right to draw conclusions from the efforts of others who, as a pure business proposition, are making advances in improved road construction, and in the advising of his clients a perfectly impartial recommendation can be made of one because of a thorough knowledge of all. One new application is, however, apparently of such merit as to be specially referred to. In this, broken stone is used; the binding material is mixed cold with the stone in the bin of the crusher; it is hauled cold to the road and is there spread and rolled. A perfectly smooth and resilient surface is secured according to this modified new practice. This is also revolutionary in that hot appliances are avoided. So far the finality of the new work is not a matter of record.

The construction of a new pavement is an incidental feature of its maintenance, and money spent in first cost may be saved many times over in maintenance, and *vice versa*. The cost of construction and an accurate knowledge of the cost of repairs are the data that will govern the final decision. But one fact may be accepted as an axiom, that a resilient surface of any fair degree of permanence will easily save its extra first cost in three years, and this point can be used in urging the new idea.

Succinctly stated, the following facts are to be accepted and may be called axiomatic:

Broken stone roads known as hard roads are not efficient.

A binding medium is absolutely imperative.

This binding material renders the character of the basic material of less importance.

The binding material will lessen abrasion by travel and eliminate scour by water.

The first cost will be greater.

The maintenance account will be reduced.

Accepting these axioms as a guide, what is the highway engineer of up-to-date proclivities going to do? The writer, being in that position, or rather claiming to be, may cite his own practice as a guide to others for better or worse; and the conclusions arrived at are as follows: First as to construction:

To build all roads in the future with a medium.

To use existing practice in construction as a basis for all new work, except that less rigidity be required in the character of stone used, provided it is frost proof.

That the media used shall be subject to chemical analysis and control.

That the application of the media shall be strictly defined in the specifications.

To that end a complete specification has been recently prepared by the writer. In addition to the usual clauses of a telford pavement specification, the following requirements are made: After the bottom pavement is chinked, a layer of screenings not less than one-half inch in diameter is spread and rolled smooth. On the top of this is spread four inches of 1½-inch stone and rolled. A coating of screenings is spread and rolled on top of this course, until a fairly smooth surface is obtained and the small stone has penetrated the spaces of the 1½-inch stone. On this is spread a coating of hot liquid asphalt of designated analysis, at the rate of 1 1-3 gallons per square yard. Sufficient dust is spread to enable the roller to do its work, and no more.

In another specification requiring the use of the tar, gravel is used on the foundation course, and tar at the rate of one-half gallon is spread, with a covering of sand or fine screenings, on the top of the stone; the tar also to be subject to specific analysis. In neither of these specifications is there anything radical. There will be in use all the materials employed in the original practice, plus the medium. If the medium fails to act up to ideal requirements, the known action of the other ingredients will prevent failure.

These suggestions are given for new road work. But the problem is more intricate of treating roads now built and keeping them in a proper and ideal condition; and at this point we are confronted with the fact that the American public is not unanimous in its insistance in having the roads everywhere in good shape. Therefore, in addition to educating a progressive community in the better methods there is the onerous task of educating an indifferent community to any action at all. However, it has been found that the road movement is contagious, as regards both construction and repairs, and in good time all will be imbued with the same enthusiasm.

Take the condition the writer has to face in the maintenance problem. About 150 miles of auto-ridden hard roads are in the system. The travel, varying from that of a congested city street to a back country road, requires an application, under the old system, of from four inches of stone in one year to three inches in five years, according to the travel. A continuous system of repairs has been maintained for years and until recently the roads have been in good repute; but now new methods are imperative.

The proposition is as follows: Taking an average of five years for renewals; this necessitates thirty miles of resurfacing per year; this to be done under the new practice with a binding medium, as in original construction. This leaves 120 miles of road not to be cared for; but on these roads, where necessary, dust preventives can be used until the resurfacing is completed, in the period of five years. It is confidently expected that the economical effects of the resilient medium will then be realized and the renewal periods can be extended for some years. By that time, however, definite results can be obtained and information acquired, and future practice based upon these.

The most pertinent point in all this discussion is, what the new idea is going to cost. So far, the data acquired from limited experience indicate that the extra cost of the injected medium is from 12 to 15 cents per square yard. This may be taken as a fair basis for any community to work on. Later experience may reduce this, as in all the experiences and trials of the different processes there has been a tendency to be too liberal with the medium; it has been too rich or, as is technically stated, there has been too much "juice" in it. Experience, of course, will regulate this, but it is important to call attention to this fact for future guidance. A further fact must be noted, that cheaper stone can be used than formerly.

As to the cost of repairs by the new method, it has to be conceded that the present system, costing from 3 to 4 cents per square yard per annum, is utterly inadequate for an ideal condition. So the problem here arises, which is practically an equation: Given a dustless road, what extra cost for renewing the surface with a binding medium can be allowed, as against the three or four cents per square yard for actual wear plus the cost of one to three cents per annum for preventives? Results for solving this can be gotten at simply in any locality, and decisions arrived at. But one vital point must be always noted, namely, that a system of maintenance must be complete and continuous. Sprinkling a road with oil or other mixture two or three times a year means the creation and maintenance of a system for such purpose. The elimination of any factor of maintenance in public work is generally considered a desideratum. The writer hopes in the near future to have additional data on question to disseminate.

EFFECT OF GEOLOGY ON PAVING

THE geological features and natural resources of a section of country have a very large influence on the classes of pavement adopted by it, as is shown by the table on pages 362, 3 and 4. Space is lacking this week for a full discussion of this table, but a brief examination shows that the granite quarries of New England contribute 52½ per cent of the paving in that section, and that the adjacent Middle Atlantic States use granite blocks for 27½ per cent, brick for 21½ per cent and asphalt for 44¼ per cent—all largely imported. The clays of the Ohio Valley furnish brick for 48 per cent of the streets of that section and the Upper Mississippi and Missouri valleys. The asphaltic oils of the southwest and extreme west furnish asphalt for paving and oil for surface treatment for all the States along and west of the Rocky Mountains.

PAVING IN THE UNITED STATES

Amounts of Various Kinds of Street Paving at the Beginning of 1909—Data Contributed by City Officials for This Compilation—Square Yards of Each Class Now in Service in Several Hundred Cities

Name of City	Asphalt	Brick	Macadam	Sand Stone	Stone Block	Asphalt Block	Bituminous Macadam	Bitulithic	Wood Block	Miscellaneous
New England:										
Biddeford, Me.			5,400							9,505 Hassam
Gardiner, Me.			15,400		9,500					
Portland, Me.		3,444	195,277		261,299			40,871		5,001 Hassam 13,015 Cobble
Westbrook, Me.			28,000		2,700					
Dover, N. H.			*3							
Laconia, N. H.	8,594		18,607		4,674		9,848			
Barre, Vt.			20,268		9,295					
Beverly, Mass.			*20							9,000 Hassam
Dudley, Mass.			*2							
Everett, Mass.			401,700		40,000			5,000		
Fitchburg, Mass.			160,000		110,000					
Foxborough, Mass.			27,000							
Haverhill, Mass.			212,233		88,311					
Malden, Mass.		2,313								
New Bedford, Mass.	10,891	9,276	852,624			8,731		41,300		66,957 "Block" 167,600 Cobble
Newton, Mass.		400	1,500,000		40,000					
North Adams, Mass.		43,298	*8		3,366					
Springfield, Mass.	7,877	85,666	1,105,031		37,513			39,168	28,683	
Somerville, Mass.	10,410	5,640	*65		66,300			14,690		36,800 Hassam
Southbridge, Mass.		9,000	3,000							
Waltham, Mass.		2,806.9	442,386.7		8,730.5		8,608		1,557.7	249,751 Gravel
Whitman, Mass.			*7.5							
Worcester, Mass.	12,698	9,464	812,746							266,570 other kinds
Central Falls, R. I.			85,000		20,036					
Newport, R. I.			100,890		17,609					
Pawtucket, R. I.		1,965			90,815			60,067		
Providence, R. I.	90,586	7,420	2,390,919		586,440			21,189		88,199 Cobble
Westerly, R. I.					10,000					
Woonsocket, R. I.		9,400	176,000		7,000			12,000	2,000	
Bristol, Conn.			20,000		500					
Danbury, Conn.			115,000		36,000					
Meriden, Conn.	7,219	10,630	*7							*49 Gravel
New Britain, Conn.			390,000					3,580		
New London, Conn.		18,000			25,000					750 Hassam
South Norwalk, Conn.		8,700	88,000		2,300					
Middle Atlantic:										
Amsterdam, N. Y.	20,000	47,000	40,000	2,200	8,000					
Binghamton, N. Y.	55,456	216,673	*5							
Buffalo, N. Y.	4,258,635	331,097	358,902		1,970,005					
Corning, N. Y.		72,615	7,594	19 913						
Elmira, N. Y.	104,813	82,832	*5.69		29,634		11,789			
Geneva, N. Y.	29,300	72,979	67,115	2,406			37,008		1,606	1,870 Cobble
Gloversville, N. Y.	14,410	51,252	12,820							
Jamestown, N. Y.		300,000			2,000			11,000	1,500	
Little Falls, N. Y.	40,000		110,000							
Lockport, N. Y.	13,000	90,000	20,000		10,000					
Mechanicsville, N. Y.		45,000								
Middletown, N. Y.		*2½	*35							
Ogdensburg, N. Y.		5,834	233,000	3,000						
Olean, N. Y.		105,800	5,200							
Penn Yan, N. Y.		5,385	*2							
Rochester, N. Y.	966,679	736,215	428,548	375,159				20,800	21,486	
Syracuse, N. Y.	667,156	474,156		84,238		68,183		3,767		
Tarrytown, N. Y.	2,503	15,100	*9				981			
Troy, N. Y.	101,089	261,915.55	53,543		455,199	7,860				
Watertown, N. Y.	71,000	25,000	440,000	6,800						
Bayonne, N. J.	126,800	25,200	300,700		62,300				4,500	
Boonton, N. Y.			6,573							50,000 Slag
Camden, N. J.	337,352	37,203	57,988		241,825	45,298				55,316 Cobble 205,523 Rubble†
Dover, N. J.			*7							
East Orange, N. J.		400	880,000							
Jersey City, N. J.	476,091	11,733	332,327		195,148				5,594	
Newark, N. J.	1,026,224	653,815	319,044		1,432,621		1,278	139,712	1,278	243,704 Trap
Passaic, N. J.	33,652	3,000	498,960		16,193					
Plainfield, N. J.		17,331	*47.6							
Summit, N. J.			*30							
Allentown, Pa.	251,219	32,083	135,880				29,733			
Ashland, Pa.		18,000								
Beaver Falls, Pa.		100,000								
Bradford, Pa.		203,182	3,171		698					
Carbondale, Pa.		50,000								
Columbia, Pa.			*16							
E. Mauch Chunk, Pa.			4,500							
Easton, Pa.		*2.6	*34							
Erie, Pa.	508,976	318,859			67,740				877	
Greenville, Pa.		186,500								
Hanover, Pa.		9,000	146,000							
Harrisburg, Pa.	657,622	30,727				7,998		2,009	3,006	
Hazleton, Pa.		43,166	*40					7,251		
Homestead, Pa.		290,000			1,200	1,330				
Jersey Shore, Pa.		28,000								
Meadville, Pa.	*.63	*9								
Norristown, Pa.		*4.90	*19.5		*1.42			70,000		
Pittsburg, Pa.	2,701,918	479,327	155,257		3,385,283	59,390				401,054 Cobble
Scranton, Pa.	227,437	112,101			34,076			25,818		
Shamokin, Pa.	1,200	75,000								
Steelton, Pa.									32,000	
Titusville, Pa.	24,000	107,000								6,000 Cobble
Warren, Pa.		50,000				20,000				
South Atlantic:										
Washington, D. C.	2,868,606	22,415	1,310,733		474,248	559,609				165,356 Cobble
Baltimore, Md.	230,642	156,690	728,556		857,069	405,302		72,605	35,109	5,084,213 Cobble 25,770 Mosaic B'k
Cumberland, Md.		120,874.68								42,887 Cobble
Clifton Forge, Va.			18,000							

* Miles; width and square yards not given.
† Rubble is described as "Paving of granite stone of irregular shape, the stone not being of even fracture or dimensions like Belgian blocks."

Name of City	Asphalt	Brick	Macadam	Sand Stone	Stone Block	Asphalt Block	Bituminous Macadam	Bitulithic	Wood Block	Miscellaneous
South Atlantic—*Continued.*										
Danville, Va.		42,361	4,590							138,382 Rubble
Lynchburg, Va.		*2	*4							*11 other kinds
Norfolk, Va.	318,000	37,850	23,000		212,000	26,164		19,900		
Portsmouth, Va.	75,000	18,000			*4					
Winchester, Va.		11,000	180,000							200,000 other kinds
Fairmont, W. Va.		227,690	2,666							
Wheeling, W. Va.		451,000	26,000							58,905 Cobble
Asheville, N. C.		115,642	15,218		32,235			136,745		
Charlotte, N. C.		7,200	*40					40,000		
Wilson, N. C.			260,000							
Charleston, S. C.	*.75	*3.5	*4.5		*17.5					*6 Gravel *2 Shell
Greenville, S. C.			92,655							
Orangeburg, S. C.		8,700								
Albany, Ga.		12,000	19,000							
Americus, Ga.			44,000							
Atlanta, Ga.	*7	*2	*37		*48			*3	*3	
Augusta, Ga.		92,000	550,000		51,000					450,000 Gravel
Brunswick, Ga.										100,000 Shell
Elberton, Ga.		25,000								
Gainesville, Ga.			1,500							
Macon, Ga.										*6½ asp., br'k & st'ne
Savannah, Ga.	141,000	314,680			81,852	41,977				150,032 Cobble 14,912 Chert. 25,055 Gravel 72,512 Shell
Valdosta, Ga.		40,000								
Daytona, Fla.			10,000							90,000 Shell
Palatka, Fla.		28,000	1,000							600 Gravel
Pensacola, Fla.		13,211								
Ohio Valley:										
Akron, O.	55,000	800,000	85,000		20,000					
Ashland, O.		153,882								
Bryan O.		58,000								
Canton, O.		372,000								
Chillicothe, O.	19,000	195,000								
Cleveland, O.	440,120	3,462,318	45,031	2,321,983						
Coshocton, O.	24,640	108,930								
Dayton, O.	445,045	562,060	22,600	14,654	20,466	2,400				
East Liverpool, O.		239,360								
Ironton, O.		111,373	205,117			21,022	11,741			
Lakewood, O.	198,000	192,000						20,000		
Marion, O.	70,000	300,000	100,000			20,000				
Newark, O.		210,000								
Niles, O.			9,520			47,273				
Painesville, O.		84,044								
Springfield, O.	18,623	240,630				6,400			297	
St. Mary's, O.		*5	10,000							
Toledo, O.	425,000	1,825,000	150,000		500,000	153,000			75,000	
Warren, O.		73,333	11,994		4,332	60,839				
Wellston, O.		70,000	72,000							
Wellsville, O.		*8								
Zanesville, O.		550,000				21,328				
Auburn, Ind.	50,000									
Bedford, Ind.		49,560	100,000							
Bloomington, Ind.			440,000							
Crawfordsville, Ind.		250,000	2,500							
Decatur, Ind.		93,000	135,000							
Fort Wayne, Ind.	530,196	356,906				4,268				
Huntington, Ind.	40,000	135,000	16,000					16,000		136,800 Gravel
Kokomo, Ind.	23,000	115,000	175,000							
Lebanon, Ind.		80,000								
Lafayette, Ind.	85,599	55,000								
Ligonier, Ind.		9,500								
Madison, Ind.		1,560	410,000							
Martinsville, Ind.		25,000	28,000							
Richmond, Ind.		*1.5	*14							*0.2 Concrete
Shelbyville, Ind.		500	150,000							
South Bend, Ind.	150,000	900,000	30,000							30,000 other kinds
Terre Haute, Ind.	80,000	500,000	60,000							
Belleville, Ill.		300,000	500,000							
Carlinville, Ill.		30,000	1,000							
Champaign, Ill.	10,000	300,000								
Chicago, Ill.	6,100,000	1,520,000	8,656,000		912,000				7,840,000	
Clinton, Ill.		40,000								
Decatur, Ill.	*8	*24						30,000		
De Kalb, Ill.		*6½	*1½							
East St. Louis, Ill.		800,000	2,500		8,500					
Elgin, Ill.	23,000	85,980	38,524							
Evanston, Ill.	48,416	168,070	805,410						6,320	
Freeport, Ill.		*12	*15							
Galesburg, Ill.		*21								
Jerseyville, Ill.		35,000								
Joliet, Ill.	190,000	90,000	400,000							
Kewanee, Ill.	26,726	74,062								845 Concrete
Marengo, Ill.		7,000								
Mattoon, Ill.		300,000								
Moline, Ill.	120,000	260,000	3,000				7,400			
Monmouth, Ill.		153,000								
Murphysboro, Ill.		45,000	25,000							
Oak Park, Ill.	*4.6	*7.8	*36.5						*2.4	
Paris, Ill.		164,189	2,600							50,000 Gravel
Pekin, Ill.		18,000								
Quincy, Ill.		*27	*11							
Rockford, Ill.	38,206	60,552	1,100,000							
Springfield, Ill.	96,950	912,000	28,000							
Streator, Ill.		277,528	12,000							
Covington, Ky.	72,000	212,000	400,000							
Hopkinsville, Ky.			*24							
Ludlow, Ky.		20,000	60,000							
Owensboro, Ky.	32,000		*11							*3 Gravel
Chattanooga, Tenn.	60,995	94,320	34,407		57,298	20,340			773	221,080 Chert.
Clarksville, Tenn.	4,700		*6							
Knoxville, Tenn.	106,154	84,191	1,012,961					33,123		23,571 Granitoid
Upper Mississippi and Missouri:										
Grand Forks, N. D.			1,800	2,800					257,106	
Aberdeen, S. D.									45,500	
Deadwood, S. D.		20,000								
Lead, S. D.		16,000	5,000							
Sioux Falls, S. D.					78,000					
Ann Arbor, Mich.		24,500	10,000			34,843		7,518		
Detroit, Mich.	1,179,417	1,905,935	400,000		102,678	45,021			3,331,761	1,705 Concrete

* Miles; width and square yards not given.

Name of City	Asphalt	Brick	Macadam	Sand Stone	Stone Block	Asphalt Block	Bituminous Macadam	Bitulithic	Wood Block	Miscellaneous
Upper Mississippi and Missouri—Cont										
Escanaba, Mich.	48,122		154,287							133,550 Clay & gr'v'l
Grand Rapids, Mich.	*5.83	*14.34	*6.27			*1.44	*.34		*3.71	*.824 Concrete
Holland, Mich.		30,000								
Kalamazoo, Mich.	60,000	200,000	6,000			40,000		45,000		8,000 Concrete
Lansing, Mich.		227,977								
Ludington, Mich.			160,000							
Saginaw, Mich.	318,283	295,200	166,380						202,607	52,993 Cobble
Three Rivers, Mich.		18,000								
Albert Lea, Minn.		649	4,400							
Crookston, Minn.	18,863		23,384							91,111 Gravel
Duluth, Minn.	20,000	25,000	200,000				400,000			
Minneapolis, Minn.	164,447	360,000	225,000	330,000	260,000				375,000	
Red Wing, Minn.		600	18,888							
Stillwater, Minn.		10,488	13,800	3,070	2,024					
Winona, Minn.		*3.5	*7							
Antigo, Wis.			*0.6							
Ashland Wis.	29,500	5,000	49,000						15,000	
Baraboo, Wis.		24,500	124,000							
Chippewa Falls, Wis.		34,000	12,200							
La Crosse, Wis.		140,564	232,447						11,146	
Portage, Wis.		13,000								
Sheboygan, Wis.		42,556	137,661						89,726	
Superior, Wis.	15,583	3,000	200,000	15,440			43,275		7,516	
Watertown, Wis.		60,000	25,000							
Wausau, Wis.			250,000						30,000	
Boone, Ia.		118,607								
Cedar Falls, Ia.	17,000	60,000								
Centerville, Ia.		135,000								
Council Bluffs, Ia.		480,000	20,000							
Creston, Ia.		62,000								
Dubuque, Ia.		165,000	1,400,000						800	
Indianola, Ia.	10,000									
Iowa City, Ia.		161,000	32,000					23,000		
Keokuk, Ia.		72,132	501,800							
Marion, Ia.	12,400		18,000							
Marshalltown, Ia.	64,400	160,000								
Mason City, Ia.	24,000	47,480							7,500	
Oelwein, Ia.		28,722.4								
Oskaloosa, Ia.		300,000								
Ottumwa, Ia.	30,000	250,000								
Shenandoah, Ia.		10,000								
Sioux City, Ia.	252,633	182,002	52,188						95,478	848 Cement
Waterloo, Ia.	299,781	181,000								
Beatrice, Nebr.		120,000								
Butler, Mo.			*5							
Cape Girardeau, Mo.			50,000							200,000 Gravel
Jefferson City, Mo.		35,960	209,500							
Kansas City, Mo.	3,250,000	665,000	450,000							
Kirksville, Mo.			60,000					15,000		
Lexington, Mo.		40,200	90,000							
Nevada, Mo.		18,000	45,000							
Richmond, Mo.		3,000	21,350							
Webb City, Mo.		40,000	180,000							5,500 Imperial 125,000 Gravel
Atchison, Kan.		396,877	25,024		2,032					
Kansas City, Kan.	279,541	836,252	72,000		2,974				32,065	
Leavenworth, Kan.	67,000	520,000	25,000							
Manhattan, Kan.			18,000							
Ottawa, Kan.		82,000								
Salina, Kan.		84,000	5,400					32,000		
Lower Mississippi and Gulf:										
Chickasha, Okla.	27,455	17,000								
Oklahoma City, Okla.	560,000	50,000	7,000							
Shawnee, Okla.	200,000	100,000								
Little Rock, Ark.	90,000	130,000	300,000		20,000					
Pine Bluff, Ark.		121,000	61,000							37,800 Gravel
Birmingham, Ala.	3,022	67,100	1,436,797		61,025			62,327		
Decatur, Ala.		6,500						26,500		
Huntsville, Ala.		3,000	81,511							
Greenville, Miss.		*2								
Jackson, Miss.		30,000								
Vicksburg, Miss.		60,000								7,603.8 Concrete
El Paso, Tex.		5,000	45,000					110,000		
Galveston, Tex.		102,784								429,968 Shell
Houston, Tex.	160,462	295,930	28,148		1,892				50,582	595,766 Gravel 25,558 Shell
Paris, Tex.		6,000						11,000		
Tyler, Tex.		20,500								
Baton Rouge, La.	40,000							59,000		
New Orleans, La.	*55.14	*10.20								*182 other kinds
Rocky Mountains:										
Anaconda, Mont.			28,000							
Great Falls, Mont.									18,000	
Helena, Mont.		22,000	30,000							
Ogden, Utah	133,000		158,000							
Salt Lake City, Utah	399,122		64,336.7		58,937.7					6,186.6 Cement
Boulder, Colo.										100,000 Gravel
Greeley, Colo.										440,000 Gravel
Pueblo, Colo.	102,631		17,330					38,866		
Reno, Nev.	50,000		25,000							
Pacific Coast:										
Bellingham, Wash.	45,000	17,000								2,500 Petrolithic
North Yakima, Wash.		62,000	100,000							
Seattle, Wash.	775,210	231,228	16,406	80,277	5,383				3,216	764 Hassam
Spokane, Wash.	200,000	5,000								*40 Gravel
Tacoma, Wash.	*31.7	*5.6	*.74	*5.75					*.06	*4.08 Plank
Walla Walla, Wash.	*5½									
Eugene, Ore.								90,500		
Portland, Ore.	290,647	31,433	1,682,541		141,434			409,353	41,124	157,280 Plank 2,095,981 Gravel
Salem, Ore.			90,000					49,452		
Berkeley, Cal.	33,000		2,450,000							
Pasadena, Cal.	280,000		110,000							
San Bernardino, Cal.	28,000	4,000	55,000							
San Jose, Cal.			*50				143,552			
Santa Cruz, Cal.	15,000		103,250							
Stockton, Cal.	120,000		1,000,000		5,000				300	1,250,000 Gravel
Vallejo, Cal.	35,000									100,000 Petrolithic
Watsonville, Cal.			72,800				12,200			

*Miles; width and square yards not given.

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MARCH 3, 1909.

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Problems of Pavement and Macadam Repairs

THE past few years have seen almost a revolution in city paving. In the larger cities paving has replaced macadam on thousands of miles of streets, and in the smaller ones macadam has replaced mud. Within the past five years the guarantee has expired on enormous amounts of asphalt paving; and this, and the retirement of macadam to the inefficient class by the automobile have put up to the paving departments serious questions of maintenance.

The problems of maintaining asphalt and macadam have been the most serious and received the most attention. Block pavements—stone, wood and brick—require few special appliances for this purpose; and in fact demand little attention until complete renewal is necessary, except for repaving over cuts.

In the case of asphalt the physical methods to be employed are well understood, and the problem is largely one of economical operation and efficient oversight. But the best treatment for macadam and so-called "hard roads" has not been generally agreed upon, by any means. There are three general methods advocated—dust laying, permanent surface treatment and reconstruction.

We would call special attention to the article on page 359 by James Owen, discussing this question of hard road treatment. The first macadam roads in this country to attract special attention by their excellence were those of Essex County, N. J., and they are still well in the van; and Mr. Owen was from the beginning the engineer responsible for their construction and maintenance. He has watched and studied all the later-day treatments and is convinced that the old macadam must be supplanted, in most cases, by resilient roads with bituminous binder. His conclusions are of more than ordinary interest and value because of his long connection with high-grade roads and his standing as an engineer.

Repairing asphalt pavements was at first by contract. This plan was found, however, to possess several disadvantages, the most serious being the difficulty of getting small patches attended to promptly. The question of guaranteeing such patches, also, was a difficult one to solve satisfactorily.

These conditions led to the purchase by cities of portable asphalt plants for promptly attending to all such repair work. Effective work in this line required the employment of foremen experienced in this class of work and the organization of gangs for the service. But, the gang once organized and the plant in hand, it was found that they could not be kept in continuous service on patching, and so small stretches of new paving were undertaken. This has been in general the progress, more or less rapid, toward municipal asphalt plants in a considerable number of cities; and more than a dozen have found it desirable to secure increased economy by advancing the last step, from the portable to the permanent plant of 1,000 cu. yds. capacity or more. The results obtained by several are given in detail in another part of this issue.

DUST PREVENTIVES AND ROAD BINDERS

Experiences of Municipal Officials with Various Substances—Latest Opinions of Unprejudiced Experts—Oils, Asphalts, Tars, Deliquescents—Details of Cost, Frequency of Application, Duration of Effects

Dust Preventives

A considerable number of materials have been placed upon the market recently for the suppression of dust and the binding of the surface materials of macadam and dirt roads. Certain of these accomplish little more than temporary laying of the dust while the binding effect of others is more or less permanent. These may be generally classed under the heads of deliquescents, oils, emulsions and tars. Reference has been made to all of these in the columns of the Municipal Journal at frequent intervals. We have thought it desirable, however, to obtain the latest possible expressions of opinion of a number of unprejudiced municipal officials concerning the various materials of this nature which they have used, and accordingly wrote to a few of those who had used each of the various kinds, requesting a brief statement of their experience. In two or three instances the replies have referred us to recent official reports of the writers, in which instances quotations or abstracts from these reports have been used in lieu of special statements.

The letters received are as follows. As more than one material was referred to in several, it was not possible to arrange them strictly according to the materials.

Dust Layers

Tuxedo, N. Y., February 24, 1909.

We have used Dustoline on some of the main roads through our town with very good success, and propose to use it more extensively during the coming summer.

We have found that it is not only efficient in laying the dust, but also in bonding the road. Those parts of the roads where Dustoline was sprinkled have worn better than the other parts of the same roads, although subject to a larger amount of traffic. The roads on which we employed it are not macadamized ones, but well-graded, dirt roads top-dressed with gravel. We found two applications last summer sufficient. The first was put on in May, the second in August. The application was made from an ordinary sprinkling wagon.

Geo. Griswold, Chairman,
Board of Highway Commissioners.

(Report of Street Commissioner J. K. Sullivan, of Newport, R. I., for 1908)

This is the second year that we have applied Dustoline to the roadbeds of certain streets and we have used during the past season three tank cars containing 24,219 gallons of the material. The excellent result derived from the use of Dustoline is the fact that it keeps the dust laid continuously, while the effect of fresh water is temporary. Salt sea water is far superior to fresh water as a dust layer and can be applied much more economically than Dustoline, because we have an ample supply of salt water constantly on hand, which costs us nothing, with the exception of installing pumping stations, etc.

BELLEVUE AVE., NEWPORT, SPRINKLED WITH DUSTOLINE

Dustoline in good dry weather will keep the dust laid for a period of from six to eight weeks. The life of this material is very much shortened, however, by heavy rainfalls. Under weather conditions such as we experienced last summer, the cost of applying Dustoline to a 20-foot roadbed was about $225.83 per mile for the season; which is $86.29 per mile less than last year. The reason for this difference in cost is that some of the streets which were treated last year did not require so heavy an application of the material this year. The total cost of dust laying this year was as follows: water, $10,606.30; applying of Dustoline, $1,919.59; making a total cost of $12,525.89.

West Newton, Feb. 23, 1909.

In reply to your request for information regarding results in the city of Newton of using different road materials, I am sending you in tabulated form some of the costs of the work and also state the following methods which have been employed in carrying on the work:

TARVIA

One of the main thoroughfares (Beacon street) becoming badly worn, we found it necessary to resurface and decided to try Tarvia A. The old roadbed was spiked up with a steam road roller and a light coat of stone put on. The Tarvia was then applied at a temperature of 180° F., being sprinkled onto the street through a hose attached to the rear of a tank wagon. The amount of Tarvia used was about 1¾ gallons per square yard. The Tarvia cost 7½ cents per gallon delivered on the work. This work cost about 46 cents per square yard, this cost including labor, screenings, Tarvia and rolling.

Another section, called Hammond street, was treated much in the same manner, using less Tarvia and stone, this being a street not subject to so much heavy teaming, although used more than the average street. This cost about 28½ cents per square yard of surface treated. We have had only one or two complaints of the roadbed being in any way slippery and then by putting a very light coat of coarse sand on it this trouble has been remedied.

It is my opinion that the roadway treated with Tarvia and screenings as above will last for several years without any repairs and be almost entirely free from dust.

Early in June, 1908, Tarvia B was applied to that part of our street-watering system known as section 1, commencing at the Boston line.

The total surface treated was 51,294.53 square yards. The roadways were first repaired and cleaned; then the Tarvia was applied, 14,267 gallons being used. The cost of the Tarvia and labor applying same amounted to $904.02, or one cent and seven mills per square yard. This treatment makes a permanent, hard road surface; has proved very satisfactory as a dust preventive and has also preserved the roads as shown by their present condition in the face of very heavy traffic and a large amount of pleasure driving.

The streets in Newton, Mass., are watered the regular season from May 1 to November 1. The work is done by the city teams and drivers at a cost of from $18,000 to $19,000 per year for about 55 miles of streets watered.

In treating streets with Tarvia or Terracolio in lieu of watering, the maintenance of the equipment necessary for the work, in addition to the time lost, due to weather conditions, which is unavoidable, also the depreciation in horses and carts at the close of the season, is wholly eliminated. The cost of the work would undoubtedly be in favor of either Tarvia or Terracolio.

TERRACOLIO

One section of the street-watering system was treated with three coatings of Terracolio. The total surface treated was 83,040 square yards; the amount of Terracolio applied was 7,075 gallons; the cost, including labor applying, $1,092.06, or one cent and five mills per square yard.

The cost for each coat is shown on the tabulation giving dates of application. These tables show that after the original or first application, treatment became necessary through the squares and on streets receiving a large amount of traffic in about fifteen days, while the less traveled portions remained in good condition from five to seven weeks.

WEST NEWTON SECTION

Date applied.	Total cost.	Cost sq. yd.	Remarks.
1st coat July 8, 1908.. ..	$621.62	9 mills ...	Whole section.
2d coat July 21, 1908 / Aug. 14, 1908 ...	271.76	3 mills ...	Washing street and square, whole section.
3d coat Aug. 29, 1908 / Sept. 24, 1908 ..	198.68	3 mills ...	Washing street and square, whole section.
Labor and material....$1,092.06		1.5 cents	

NEWTON CENTRE SECTION

Date applied.	Total cost.	Cost sq. yd.	Remarks.
1st coat July 27, 1908.. ..	$775.40	8 mills ...	Whole section.
2d coat Aug. 11, 1908 / Sept. 26, 1908 / Oct. 3, 1908 ...	498.28	6 mills ...	Square and Centre street, whole section.
Labor and material....$1,273.68		1.4 cents	

On the second section only two coats were applied. The total surface treated was 90,265 square yards; the amount of Terracolio applied, 7,665 gallons, and the cost $1,273.68, or one cent and four mills per square yard.

CHARLES W. ROSS,
Street Commissioner.

(Extract from paper by Mr. Ross, before International Road Congress.)

ASPHALTOILENE

A section of Commonwealth avenue was treated with asphaltoilene which cost us 6 cents per square yard. This did not include the sweeping of the roadway and preparing it for the asphaltoilene. After about two days it had penetrated into the roadbed enough to keep it in place, then a coat of stone screenings was applied, or fine screened gravel, which I think I prefer to stone screenings in this case. It was closed to traffic for about forty-eight hours. After that it was ready to roll with a steam road roller. We used a fifteen-ton road roller, and the screened stone or fine gravel was compacted by the roller sufficient to allow the automobiles to travel over this road at a high rate of speed without any difficulty on account of skidding or spattering. It has been there about a year, and much resembles the tarvia road, only that it is more elastic. We do not know how long it will last, but the expense being so much less than the tarvia, I think we were well paid for trying the experiment. I have no doubt it will be perfectly satisfactory for another year without any additional expense in the way of repairs. I would further say that I should not recommend it in a thickly settled part of the village, where people are obliged to cross the street, as it is apt to be sticky in wet weather and will track into the houses.

TEXAS OIL

The Texas oil has been used by our city and has been applied in the following manner. The first preparation that we tried was with light fuel oil, which was applied by heating the stone screenings on a sand heater. The oil was poured upon the screenings, putting on about twenty gallons per cubic yard of stone screenings. This pile of material was turned over with the shovels, heaped up and allowed to remain about twelve hours in a large stack. Then it was shoveled into the teams and spread upon the surface of the road. It formed a very thin coating, not over one-quarter of an inch in depth, and was immediately rolled down with a steam road roller. This made a hard, smooth surface, and the fine screened stone had the effect of keeping down the dust and furnishing a binding material which was readily compacted by the roller. This work was very satisfactory, and in my opinion is a very good way to apply oil on the surface of the street.

TERRACOLIO

CLEVELAND, O., Feb. 24, 1909.

IN regard to our experience with Terracolio, I will say that during the past season we used this material on 157,494 square yards of macadam road surface, 139,433 square yards of which was on our main boulevards; 18,061 square yards being on less used connecting park drives. Our first application was made on June 11, 1908, and the last on October 21, 1908, during which time 14,201 gallons of Terracolio were used, or .092 gallon per square yard of road surface for the season. This material was used in the form of an emulsion, the first two applications being made up of a 10 per cent solution, the balance 5 per cent solution. We found it necessary to sprinkle on the main drives on an average of every eight days. We must remember, however, that last season was an exceptionally dry one.

Our labor cost amounted to a total of $341.50, making a labor cost of $.0022 per square yard. Teams cost $4.50 per day of 10 hours, including driver. Labor $1.75 per day of 8 hours. The total cost of this work was $2,058.14. This is slightly less than it would have cost to sprinkle with water had sprinkling been done 5 days per week during the same period of time.

The road surfaces upon which this material was used were entirely free from dust during the season. To an extent it formed an asphaltic coating which cemented the small particles together and preserved the road surface. This surface is still in fair condition, having stood the frost of the winter well, so that to-day our superintendent reports that in his opinion we will be able to start out at the beginning of next season with the 5 per cent solution rather than the 10 per cent. We find that in a very few places a thin top layer—probably not more than one inch deep—seems to be picking up and crumbling on the top surface of the road. This is probably due to the fact that on these spots a crust of dirt had formed over the stone, or the trap rock dust had become mixed with dirt, and it is this top layer which is now peeling off.

This material was applied from an ordinary road sprinkler, the same as water; with this difference, that towards the end of the season we were able to decrease the amount of the discharge as the road surface had become harder and smoother and required less solution to cover it. All of the roads treated with Terracolio were macadam, having a wearing surface of trap rock.

We have also experimented with a lighter oil having an asphalt base, but have not been as successful with this material as with Terracolio. We were not equipped for making as perfect an emulsion with the residuum oil as we obtained from the prepared material. We found that as the sprinkling tank became nearly empty our material was mostly oil, so that one portion of the road did not receive the same material as the other.

We have also used for the preservation of the road surface a liquid tar known to the trade as Tarvia. We found, however, that it is absolutely necessary that this material be applied on a clean, dry surface. The least amount of dirt encrusted on the stone, causes it to chip up and disintegrate into dust.

W. A. STINCHCOMB, Chief Engineer, Division of Parks.

TARVIA

NEW YORK, February 23, 1909.

The construction of roads and walks as in use in the New York Zoological Park does not differ in any way from the ordinary telford macadam construction, except for the top layer of tar and trap-rock screenings. Upon the foundation of native telford stone, well knapped down, a layer of 3 to 4 inches of trap rock crushed to 1½ inch is spread and well rolled. Over this we distribute a layer of ¾-inch stone, topped off with a thin layer of the coarser particles sieved from the ordinary ½-inch trap-rock screenings. This again is well rolled and brought to a perfect grade; then a bright, sunny day is selected and a thorough coating of boiling tar is spread upon the surface with the aid of ordinary 16-quart sprinkling cans, at the rate of about one gallon to every ten or twelve square feet. As soon as a certain amount of this tar has percolated to the 1½-inch stone, the final layer of stone dust, as screened from the ½-inch screenings, is spread over the tar and immediately rolled, so as to make it take up as much of the tar as possible. Whenever the puddling action of the roller brings any of the tar to the surface, more dust is applied until no more tar is brought up.

It is well to go over this road again after three or four days and apply stone dust, as the heat of the sun draws the tar to the surface. After many experiments with oil, asphalt dissolved in oil, ordinary coal tar, and a distilled coal-tar preparation called Tarvia, we have come to accept the last as being best for the purpose.

The failures of our early experiments were largely due to the unequal consistency of the coal tar as purchased from a gas works, to the fact that it contained large quantities of water, and also to the fact that we formerly used the screenings as they came from the quarry, rather than to separate them into the dust and larger particles.

I would say that this stone dust is separated by the aid of a ¼-inch mesh screen. This latter is important, as it seems impossible, especially during a long spell of wet weather, to keep larger stone particles from being loosened, while the stone dust, which can be more thoroughly incorporated with the Tarvia, does not separate, no matter what the weather or traffic.

As to the cost of this work, I would say that repeated experiments show it to be from three-quarters to possibly a cent a square foot over and above the cost of the construction of macadam walks or roads as ordinarily put down. Our method of constructing these tar macadam walks is considered highly successful, and the additional cost is saved the first year by the fact that they will never have to be sprinkled in summer

and that no mud is formed in the winter. It has been entirely successful on some very steep grades with heavy traffic.

H. W. Merkel,
New York Zoological Park.

(From Report of Massachusetts State Highway Commission for 1908.)

STANDARD MACADAM ASPHALT BINDER

This is a heavy asphalt residuum oil, furnished by the Standard Oil Company, 180 square yards being treated, using 1½ gallons of the binder to each square yard of surface.

The surface began to harden in twenty-four hours, and was quite hard in two or three days, and was rolled occasionally. When travel was first turned on, in about nine days, it rutted slightly, but has since hardened, so that it holds up travel and is now in good condition.

In another place, 37 square yards were treated with the same mixture, six inches deep in the center and four inches on the sides, 2.40 gallons being used to the square yard. This section rutted slightly, as in the first section, where a thinner coat was used, but it soon hardened so that it would hold up travel and is now in good condition.

Later information concerning this treatment is given by the following letter:

Middleborough, Feb. 1, 1909.

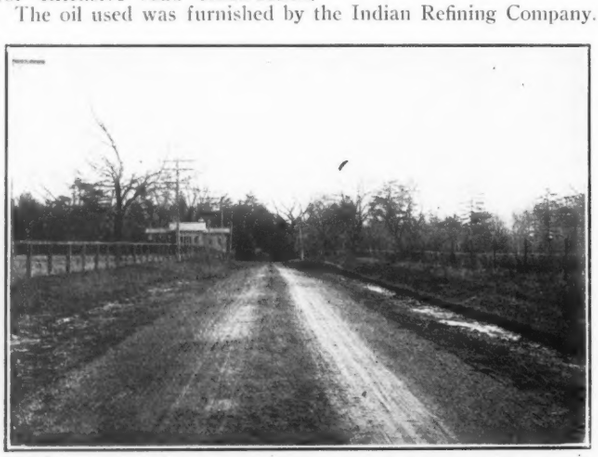
Replying to your inquiry relative to the condition of roads constructed at Wareham last fall by the use of various road oils, I would state that the section constructed by the use of the Standard Macadam Asphalt Binder has been generally in very good condition since the oil was applied. This section has shown a slight tendency to rut once or twice, but these ruts have been smoothed out all right by the travel. The weather we have had during the winter has been very hard on the roads in this section as the ground has been alternately freezing and thawing. These conditions, however, have had but little effect on the section referred to.

W. R. Farrington,
Division Engineer, Massachusetts Highway Commission.

(Extracts From the Annual Report of Colonel Frederick Gilkyson, State Road Commissioner of New Jersey, for the Year 1908.)

In Camden County, between Chew's Landing and Blackwood, we have recently completed the building of a road which is considered by a number of the road building experts to be a most excellent highway. After the second course of stone had been placed on the road, heavy Kentucky oil, having an 82 per cent asphaltic base, was applied in quantities of about three quarts to the square yard of surface. The oil was allowed to remain on the road uncovered until a sufficient time had elapsed to allow it to work into the interstices between the stones. After this three-quarter-inch stone and screenings were distributed over the surface and the road thoroughly rolled with a twelve-ton steam roller. In this construction the compression of the roller caused the oil to ooze up, affixing itself to each particle of the fine stone, leaving a smooth, uniform surface, sufficiently resistent to make it exceptionally desirable for travel either by wagon or motor vehicle. We believe that still better results would be secured by heating the one and one-half inch stone and coating it with oil before spreading it upon the road. This process would, no doubt, prove too costly for extensive road construction.

The oil used was furnished by the Indian Refining Company.



NEW JERSEY ROAD TREATED WITH HEAVY OIL

As described above; 5 months after construction.

CALCIUM CHLORIDE

Hingham, Mass., Feb. 17, 1909.

Have used calcium chloride for dust laying and get very good results from it. The cost to us for material is 1.8 cents per square yard and for labor 0.9 cents, a total of 2.7 cents for the season. We dissolve it in a tank and force it into our watering cart with an ejector, where it is diluted with water at the rate of one pound of calcium to one gallon of water. After filling the surface of the street with two or three applications, a day or two apart, we use clear water if the weather holds dry, applying additional calcium only as it is needed. We do not think there can be any set rules for applying calcium, as much depends upon the weather; the street going several days between treatments in some weather but only two or three at other times. We find it good for preventing a street from raveling during an excessively dry time. Streets treated in 1907 still showed evidence of the treatment in the spring of 1908 and held the dust until May 28.

J. F. Clifford, Supt. of Streets.

Boston, Mass., February 20, 1909.

During the summer season of 1908, about 100,000 square yards of roadway surface of the Metropolitan Park Drives were treated with calcium chloride for the suppression of dust.

For macadam and gravel-surfaced roads which are in good condition, and which are subject to comparatively light traffic, such as residential streets, especially if they are shaded, I consider this treatment excellent as a substitute for street watering, as it provides a perfectly dustless surface at all times with none of the objectionable features of tars and oils, such as injury to clothing and paint and unpleasant odors.

The method used in the application of calcium chloride was to purchase the material in granular form and dissolve it in large iron kettles or tubs by the application of live steam. One pound of the material was used to one gallon of water when sprinkled on the road surface, and the ordinary watering carts were used for the application. A sufficient quantity of the material for one load (600 pounds for a 600 gallon cart) was placed in the tub with enough water to dissolve it with the aid of the steam, and it was then transported to the standpipe nearest the place of application. This solution was then drawn from the tub into the watering cart by means of an ejector attached to the standpipe, which process mixed the heavy solution thoroughly with the water as the cart was filled. The cart then sprinkled the reduced solution upon the road, depositing one-half its load, then turning about and going over the same section with the other half, making two sprinklings for one application. This method is repeated with each load.

The roadways require one application in from three to five weeks, depending upon the weather conditions and upon the conditions of traffic in the various sections treated. In very dry weather it is necessary to give the roadways a sprinkling of water occasionally between treatments, in some places once a day, in others, once a week. If the weather is damp, with occasional rains, no watering is necessary between treatments.

Judging from the cost of our work on the different sections treated, which were for varying lengths of time, I estimate that the cost of the treatment with calcium chloride for six months, including necessary watering between treatments, would be from three to four cents per square yard of road surface, depending again upon the weather and traffic conditions.

The binding qualities of calcium chloride are very slight, and its only claim as a road preservative is in the fact that it prevents the dust from being blown away.

BITUMINOUS BINDERS

Bituminous binders, such as refined tars and asphaltic oils, have been used during the past three years in the treatment of the parkway roads for prevention of dust and preservation of the road surfaces. Where the roads were in fairly good condition at the time of the application, these treatments have been quite satisfactory as temporary expedients for their preservation. I consider them temporary because it is necessary to do more or less work of re-treating and patching each year with these surface treatments.

The cost of labor and materials for the original treatment with these materials has been for oils about 6½ cents per square yard, and for tars about 7 cents per square yard, on an average. The cost for re-treatments and patching averages about 4 cents per square yard per year for each.

During the summer of 1908 some work of resurfacing macadam roads with broken stone, with bituminous binder incorporated with the surfacing material, was done on the parkways. In this work refined tar, and a mixture of refined tar and artificial asphalt in the proportion of two-thirds tar to one-third asphalt, were used. About one and one-half gallons of the binder to the square yard was spread upon the stone.

The cost of labor and materials for this work, which includes scarifing, furnishing and laying an average of 3 inches of broken stone, and furnishing and applying the bituminous binder, was about 35 cents per square yard.

The results of this method of construction have been very satisfactory so far, especially so on the portion where the asphalt mixture is used.

This method of construction on macadam roads, either for resurfacing or for new work, using either the asphalt and tar mixture or a straight asphalt, is, in my opinion, the proper one for more permanent work, although it may be necessary from time to time to give this work a light surface treatment to maintain it in first-class condition.

These types of construction are used on roads which are subject to considerable rapid and heavy automobile traffic.

JOHN R. RABLIN, Engineer Metropolitan Park Commission.

BOSTON, MASS., February 21, 1909.

At your request, I send you a brief statement of my experience with calcium chloride and oil emulsion for dust suppression.

CALCIUM CHLORIDE

During the season of 1908, the city of Boston, under contract with the Calcide Process Co., treated about 270,000 square yards of macadam roadways with calcium chloride for laying dust. The price paid for five months was 4 cents per square yard. The material is brought to the roadway in carts of about 600-gallons capacity, filled with a concentrated solution of 40 per cent calcium chloride, Sp. gr. 1.400. A nest of five 110 gallon galvanized iron cans are carried on a rack on the rear of the cart. The cart is driven to a standpipe on the roadway. A can is placed by the side of the standpipe and filled with the solution. The remaining cans are left at other standpipes and filled. By means of a syphon arrangement the cart is then refilled with water from the standpipe and with the 110 gallons of the 40 per cent solution by one operation. The empty can is placed on the rack and the 8 per cent solution spread on the roadway. The remaining cans are similarly picked up and the operation repeated. One load, or about 600 gallons, covers about 1,900 square yards, or 10 loads to the mile of a 32-foot roadway. In order to fill the surfaces thoroughly with the salt, two applications are made the first week. The following applications average 21 days apart. In shady areas the salt retains the moisture for a longer period than in those exposed to the direct rays of the sun. It is necessary to feed the salt by the application of ordinary water, varying from one to three times per week, according to conditions of the weather and the road treated.

The calcium chloride treatment by this method gave very satisfactory results. It has no odor, it is clean and, though not a road builder, it leaves the surface of the road in much better condition at the end of the season's treatment.

OIL EMULSION

About 25 miles of macadam roadways were also treated with an oil emulsion, mechanically prepared by the use of a soap solution to emulsify a residuum, asphaltic base oil of 25 to 30 per cent asphalt.

The emulsion is prepared as follows: A soap solution consisting of 25 pounds of cotton-seed oil soap (costing 4⅝ cents per pound) to 50 gallons of steam-heated water is prepared. This solution is mixed with 100 gallons of emulsion oil (costing 4¾ cents per gallon). Three hundred gallons of this mixture is agitated about twenty minutes in a 600-gallon water cart until the emulsion is complete.

An ordinary watering cart of 600-gallons capacity is filled with this preparation and driven to the roadway. One hundred gallons of the emulsion is drawn into a cart, diluted with water from a standpipe and spread. Two applications are applied during the first four days. The following applications vary from eight to twenty-one days, according to the weather conditions, locations and surface conditions of the road. The amount of oil used per square yard is 0.1 gallon. The cost of oil preparation and spreading per gallon, is .106 cent. The average cost per square yard for six months was .034 cent.

This treatment gave very satisfactory results. The roads were dustless, they became coated with a smooth, hard surface which was not washed into the gutters, thus adding life to the wearing surface of the roadway.

There is the disadvantage of a slight odor and a wet, oily surface for three or four hours, until complete penetration. These conditions are more than offset, however, by the results gained in laying the dust, in the protection and prolongation of the life of the roadway.

C. B. PRATT, Deputy Superintendent,
Street Cleaning and Watering Division, City of Boston.

DISCUSSIONS, QUESTIONS AND ANSWERS

Readers of the Municipal Journal and Engineer are invited to send for publication in this department inquiries concerning such matters as can probably be answered from the personal experiences of others, or from information on file in this office. Any who can furnish the desired information are requested to do so, in addition to any reply which may be given by us.

It is especially desired that an exchange of opinions and discussions on mooted subjects find place here. We will welcome any opinions, whether or not we agree with them; requesting, however, the omission of all personalities.

COST OF POLES AND WIRE CONSTRUCTION

Editor of MUNICIPAL JOURNAL AND ENGINEER:

I have been looking up the subject of values for poles and wire construction relating to electric power, telephone and telegraph systems for assessment purposes. Our old system of having each company declare what it owned usually brought forth a statement too vague to be of value.

I have located every pole of each company upon my general map, using different colors for the different companies. Then by taking each street, using a note-book, record the number, size of wires of each owner beginning at a certain corner and continuing successively. Then knowing number of each size of wire scale length from map. My data for values are as follows, but I think it is low:

Cost of poles erected—35-foot poles, $6; 40-foot poles, $7; 45-foot poles, $9; 50-foot poles, $12; 55-foot poles, $15; 60-foot poles, $20. Galvanized-iron telegraph wire, 4 cents per pound; copper telegraph and telephone wire, 15 cents per pound. Cost per wire per pole—erecting arm, 5 cents; peg, 1 cent; insulator, 4 cents; bolt, brace and gaining (proportion to each wire), 4 cents, equals 14 cents per pole per wire; 40 poles per mile equals $5.60 per mile; cost of stringing wire, $6 per mile; total, $11.60. Copper wire, 210 pounds per mile, erected, $43.10 per mile; galvanized wire per mile, erected, $23.60 per mile.

Can you tell me the cost of lead telephone cable per foot, first for 25-pair cable and also 50-pair cable, also the cost of erecting same? I have a dim recollection of some one testifying at a hearing that lead cable costs $80 per mile to construct.

Yours very truly, ROBERT P. HOWELL.

PHILLIPSBURG, N. J.

Inquiry of New York parties who deal in lead cables give us the information that they cost as follows, net, f.o.b. New York: Twenty-five pair, 87 cents per foot; fifty pair, $1.54 per foot. The dealers could not inform us concerning the cost of erecting. If any of our readers can inform Mr. Howell as to actual costs in their experience or to their knowledge we hope he will not fail to do so. The matter is one of interest to municipal lighting plants, and to departments having charge of city wiring; and undoubtedly many such have figures bearing on the question.

DETECTING LEAKS IN WATER MAINS

Editor of MUNICIPAL JOURNAL AND ENGINEER.

DEAR SIR: I have read with interest the article in your issue of the 27th of January, entitled "Detecting Leaks in Water Mains," and stating how the "waste and leak gang" in Buffalo, N. Y., detected leakage in that city. The article was of peculiar interest to me by reason of the fact that I adopted a similar method about three years ago to locate leaks and waste in several districts in this city where I suspected that the mains were "weak" and the house fixtures defective.

I would select some district, say two or three blocks in size, and "deaden" it—that is, cut all water from it. Where fire hydrants were sufficiently close to use I would connect up 1¼-inch hose to a "live" hydrant and feed water through meter

into the "dead" district through another hydrant inside of said district. Where fire hydrants were too far apart for convenient use I would put an inch cock in the main on either side of a gate valve separating the "dead" from the "live" district and feed water through these cocks, the meter being connected up between them.

This work was all done at night so as to cause no inconvenience to water takers in the shut-off district. If the meter showed that an appreciable quantity of water was going into the cut-out district I would then have all house services cut off at the curb (these having been previously located that there might be no delay in the work) and keep a close watch on the meter as the shutting off of these services progressed. A careful watch of the meter would in some cases tell which block the most waste was in and on which side of the street.

If there was much cutting down of the rate of discharge through the meter after the house services were cut off further work was postponed until the next morning, when inspectors were sent to the shut-out district, with directions to make a thorough examination of all fixtures in the houses in an effort to locate the cause of the waste as shown by the meter. These house-to-house inspections always resulted in the finding of more or less leaky fixtures.

In one district, where the meter showed that an abnormal quantity of water was going into it, five leaks were located in one premises, these being in freight sheds and other houses of a railroad. It is true none of these five leaks was of a very serious nature, but combined they caused a loss of about 200 gallons per hour, 4,800 in a day of 24 hours, or 432,000 gallons per calendar quarter. And the railroad company was paying for this leakage, as theirs was a metered service.

When cutting off house services did not reduce the discharge through the meter the district was cut up into smaller ones and an effort made to "corner" the leakage in the mains.

The method adopted by the "gang" in Buffalo is a most efficacious one for the purpose mentioned, and I am sure it could be adopted by other cities which have like troubles, with beneficial results. The cost of these investigations is trifling. Yours very truly,

Henry V. Vail,
Chief Water Inspector.

Norfolk, Va.

TARVIA COURT DECISIONS

Editor, Municipal Journal and Engineer,

239 West 39th Street, New York, N. Y.

Dear Sir: Near the end of your excellent resumé (p. 129, issue of January 27, 1909), I note the following statement: "The case may still be carried to the Supreme Court."

When the bill in this case was dismissed by the District Judge, Messrs. Fraley & Paul, the attorneys for the defendant in this litigation, had printed and caused to be circulated a statement in which they then stated, as printed in red ink, "a decision has been rendered finally disposing of the matter and adjudicating that the one patent which Warren Brothers Company have been willing to bring to a decision, and the only one which has any real importance, is invalid." As the case had, in point of fact, been appealed to the Circuit Court of Appeals when this statement was circulated, the Barber Asphalt Paving Company felt called upon to issue another printed circular, in which they said:

"A patent suit cannot be appealed from the decision of the Circuit Court of Appeals, and while in some instances a petition is presented to the Supreme Court for a writ of certiorari, it is the almost invariable custom of the Supreme Court to deny such petitions."

The latter is no doubt the correct statement of the law and facts applicable to this litigation.

The closing paragraph of your comment upon this decision states:

"It appears that this decision covers a bituminous street pavement composed of mineral ingredients so mixed as to give the structure an inherent stability. We do not understand that this patent covers a mixture of a bituminous substance with broken stone generally, when no attempt is made to grade the mixture so as to reduce the voids below 21 per cent."

This is undoubtedly true and, on careful consideration, engineers will generally understand that a combination of several sizes of crushed stone which does not "give the structure an inherent stability," or does not have "less than 21 per cent voids" between the particles of stone, will not have the necessary property of structural strength, and on this account cannot provide a satisfactory pavement.

The patent expert of the Barber Asphalt Paving Company, Prof. Joseph W. Richards, of Lehigh University, in his direct testimony in this case, gave the following concise, clear statement of the scope of the patent in suit, now finally declared valid by the United States Circuit Court of Appeals:

"The said claims cannot be interpreted otherwise than as covering the use of any mineral aggregate in a bituminous concrete pavement composed of stones or pieces of varying size, such that by reason of the reduction of void spaces and consequent useful degree of inherent stability thereby produced in the mineral aggregate a pavement structure of better wearing qualities is produced."

This definition of the patent was accepted by counsel for complainant, and the case was practically submitted to the court on that statement as to the scope of the patent. There are, in fact, two points of importance on which counsel for both sides are agreed. First, that the decision of the United States Circuit Court of Appeals in patent cases is not appealable to the United States Supreme Court, and second, as to the definition of the scope of the four claims of the patent in suit, No. 727,505, as explained by Prof. Richards.

It thus appears that, as to the above two points suggested in your article, counsel upon both sides in this case have agreed and a decision of the court rendered sustaining the contention of complainant's counsel as to every point.

Very respectfully, J. M. Hood,
General Counsel for Warren Brothers Company.

Boston, January 28, 1909.

We can not see that the article in question in any way misrepresented the facts of the case of the legitimate conclusions to be drawn from the decision. We read the decision carefully and endeavored to present a perfectly fair synopsis and interpretation of it. As, however, we do not wish to do injustice to any party to the litigation, we publish the above in order that Warren Brothers' view may be presented.

While it is true that in a strict sense a case can not be appealed to the Supreme Court, this court can be asked to direct the lower court to give a rehearing, or to modify a previous decision; as it did in the New York gas case recently referred to at length in this journal, and as it was asked to do in the Saratoga Septic Tank case last year. It is true that it rarely interferes in patent cases; but the fact that it may do so detracts from the finality of the decision in question.

As to the second point, we do not understand whether or not our statement is excepted to. It appears plain to us that any combination of stone or other aggregate with bituminous binder, in which the stones are not of various sizes so graded as to reduce the interstices below the amount stated, fails to infringe.

NEWS OF THE MUNICIPALITIES

Divers Subjects of General Interest and Their Treatment by City Councils and Officials—Streets, Water Works, Lighting and Sanitary Matters—Police and Fire Items—Government and Finance

ROADS AND PAVEMENTS

Systematic Plans in Street Paving

Baltimore, Md.—Several city officials are advocating a plan which will result in street improvements being made according to more intelligent and uniform lines. Under this plan it is proposed to enlist the co-operation of the Councilmen, as well as all business associations organized with a view to furthering civic improvements in their particular localities. At the City Hall it is explained that the one purpose in view at this time is to eliminate what is termed as "patchwork" street paving, and to adopt some plan whereby thoroughfares may be improved systematically so as to afford connecting links with the various sections of the city. In other words, it is hoped that the old system of "one block improvement" will have been discarded, and that any money which is to be expended by the city will go toward the paving of those streets from which benefits will accrue to Baltimore as a whole.

Prisoners Will Work on Roads

Annapolis, Md.—The custom of placing the prisoners confined in the Anne Arundel County Jail at work on the county roads will soon be revived, the County Commissioners having directed Sheriff Williams to select all prisoners who are eligible for such work. The work will be done under the supervision of County Engineer Haymen. There is a double purpose behind this scheme. It not only helps toward the improvement of county highways, but also makes the prisoners earn their board.

Niagara Frontier Boulevard

Buffalo, N. Y.—What has been done in the project for a boulevard between Buffalo and Niagara Falls was fully explained at a banquet of the Niagara Frontier Boulevard Association recently held at the Prospect House, Niagara Falls. Mayor John N. Adam, of Buffalo, spoke in favor of the park scheme and a project for connecting the parks of Buffalo, Niagara Falls and the Tonawandas. President Douglass, of the association, presented maps of the surveys of different routes suggested. The recommendations of Landscape Architect Arthur A. Shurtleff were read. He favored a boulevard 200 feet wide wherever that width was possible. His recommendations also embraced a comprehensive scheme for the beautification of the route with trees and shrubbery. A motion was carried approving the route beginning at Delaware avenue, Buffalo, and running by way of Ellicott creek, Tonawanda, through North Tonawanda and by way of Martinsville, Sawyers creek, through Bergholtz and to the Packard road, and then on to Niagara street and into the city of Niagara Falls

Assessment Law Hampers Natural Development

Evansville, Ind.—The bad condition of streets in the manufacturing district and of some of those leading to it is ascribed to the operation of the improvement law, which says that streets may be improved only when the abutting property is able to bear a certain per cent of the cost of the improvement. The condition is so serious, and the normal development of the city so hampered, that Council proposes to have the city contribute to the cost of the work a sum sufficient to make up the amount that could not be assessed on the abutting property owners. It has been suggested that the large manufacturers might be willing to contribute the deficiency. In one part of the district eighteen teams were stalled within a short space of time.

Paves Intersections of Unimproved Streets

Lexington, Ky.—The city forces are employed paving the intersections of unpaved streets with brick. The idea is that the city has to stand the expense of this work anyway and by doing it in advance of the paving of the streets, the intersection serves as a street crossing.

Holyoke Paving Goes to London

Holyoke, Mass.—London will have a chance to see how Holyoke is paved and how the paving lasts. Samples of used and unused paving were shipped in response to the request that City Engineer James L. Tighe received a short time ago from the technical college that has under its charge the conducting of paving experiments for the city of London. Each paving block shipped had the story of its life inscribed on a label that was firmly attached to it.

Will Not Risk Infringing on Bitulithic Patents

Pasadena, Cal.—Petitions now being circulated and practically ready for the grading, paving and other improvements on South El Molino avenue from Colorado to California, and on Summit avenue, from Chestnut to Orange Grove avenue, will probably be changed to meet the new conditions in paving precipitated by the letter of the Warren Company demanding of the city compensation for the use of the bitulithic process in paving Los Robles avenue. The petitions for street improvement are understood to be ready for presentation to the City Council and ask for paving similar to or practically the same as the Los Robles pavement on both Summit and South El Molino. If there is any doubt about the advisability of using the Los Robles pavement, on both streets named, the demand for an immediate pavement may have the result of forcing another variety.

New Repairing Law for Syracuse

Syracuse, N. Y.—A bill affording property owners relief from burdensome assessments for resurfacing of streets and increasing the number of miles of streets which shall be paved or resurfaced in any one year has been introduced in the Legislature at Albany by Senator Holden and Assemblyman Hammond. The need for the measure arose in connection with the proposition to resurface North and South Salina street. Under the present law the entire cost of resurfacing a pavement is assessed against the property fronting on the street. This provision, it was argued in the case of Salina street, is unjust, as the pavement was worn out by the public at large and not by the property owners living in the street. The latter contended that a share of the expense should be borne by the city. As a result of agitation along this line, Assembly Clerk Ray Smith framed the bill introduced, which provides that one-third of the expense of surfacing or resurfacing a street shall be paid by the city and made a part of the general expense. Further relief is given by providing that the city, before it can order the resurfacing of a street, must repair 37½ per cent of the surface area of the street.

Engineer to Try New Bituminous Filler

Topeka, Kan.—City Engineer J. P. Rogers has invented a method of filling the joints of brick pavements. He proposes to use tar and asphalt filler in combination, the asphalt at the bottom of the joint filling about one-third and tar for the rest of the distance. He says the joint adheres, and thinks that it will be as good as all asphalt and cheaper.

Road Building to Music

Washington, D. C.—Major L. W. V. Kennon, in building the Benguet road through the mountains of northern Luzon, Philippine Islands, was obliged to study the character of his 4,000 native employees and adopt peculiar methods of developing their efficiency. He found that music was the best incentive to work. He had a band follow the gangs wherever they went and play as the men worked. From laborers worth 10 cents a day he developed the men into musical machines working in cadence with drum beats. Finally, in closing up the work, he made a wager that the road would be finished by a certain day. He promised a good cigar to every laborer if he won the bet. He won.

SEWERAGE AND SANITATION

Advises Establishing Sanitary School

Albany, N. Y.—In his annual report, State Health Commissioner Eugene H. Porter recommends the establishment of a School of Sanitary Science and Public Health at Cornell University. He also asks that authority be given the Department of Health to order sewage from municipalities to be properly disposed of. He also advises that the sanitary laws be so amended as to prohibit the establishment of a hospital camp or other establishment for persons suffering from tuberculosis in any locality without the authority of the Board of Supervision of the county or the municipal authorities.

Buffalo Has Over Four Hundred Scarlet Fever Cases

Buffalo, N. Y.—There are more than 400 cases of scarlet fever in this city. A statement given out by the Health Department says there is "an epidemic of scarlet fever, which is growing in proportions and spreading to all portions of the city to such a degree as to constitute a great and imminent peril to the public health of the city." The Board has secured an old unused school building and has fitted it up as a quarantine hospital.

New Sewage Plans May Be Required

Minneapolis, Minn.—Dr. H. M. Bracken, of the State Board of Health, has called the attention of the House Committee on Public Health to the fact that when the two Government dams between the cities are completed the sewage of Minneapolis and of Coon Creek, and any slaughter houses that may be drained into it, will be drained through four mill ponds in a run of six miles—a condition the like of which has never been permitted in the civilized world. A bill is pending which, if passed, will increase the powers of the State Board over the pollution of sources of water supply. It is suggested that Minneapolis may be forbidden to discharge raw sewage into the river.

Presents Bill for Sewer Twelve Years Old

Piqua, O.—A bill has been presented by a contractor to Council for the construction of a sewer twelve years ago. The contractor said he was busy figuring on other work and had forgotten to send a bill.

Combining for Sewage Disposal in Jersey

Newark, N. J.—A bill has been introduced by Senator Frelinghuysen in the New Jersey Senate, "authorizing any city or one or more cities or municipalities to unite in constructing and maintaining a sewage disposal plant." This would seem to foreshadow a move on the part of the New Jersey authorities to provide an alternative for the disposal of raw sewage by the Passaic valley in New York Bay by substituting sewage disposal plants. This proposed law will meet the approval of Orange and Montclair and other municipalities which have not favored the trunk sewer scheme. Vigorous opposition to the Passaic valley sewer by many of the municipalities and villages it was intended to serve was made on the ground that the United States Government would prohibit the discharge of the raw sewage into New York Harbor, and that it was better business policy to install a disposal plant at the present time than spend a large amount of money in building the expensive rock-cut outlet into New York Bay.

Milwaukee to Clean Lake

Milwaukee, Wis.—Milwaukee is fully awakened to the necessity of conserving public health, and public lectures along health lines are being given, as in Chicago. A course arranged by Marquette University has taken up several important problems. The directors of the Greater Milwaukee Associations are urging that the city health department begin a survey of the lake and determine where the sewage is being carried by lake currents, as is now being done regularly in Chicago.

WATER SUPPLY

Diver Will Inspect Intake Pipe

Duluth, Minn.—The Water and Light Commissioners have decided to have the intake pipe for the Lakewood station examined by a diver. The intake pipe is 1,500 feet long, and at the mouth is 65 feet below the surface of the water. The pipe was inspected several years ago by Mr. Duncan, of the Board, and Manager L. N. Case. The temperature of the water near the pipe at each 25 feet of its length from the shore to the mouth was taken. The temperature of the water at the mouth of the inlet was found to be the same as that of the water in the well, giving the conclusion that the pipe was intact and no water was getting into it along its length. The temperature of the water in the well and at the mouth of the intake is taken at regular intervals and found to correspond, but a more thorough inspection is desired.

Omaha Will Vote on Purchase of Water Works

Omaha, Neb.—The Water Board has decided to submit to the people at the spring election a proposition to buy the water works of the Omaha Water Company. Citizens will be asked to decide independently of the question of valuation, which is now in dispute in the courts. The proposed bond issue of $6,500,000 will, therefore, cover the largest amount that the city can be called on to pay, and if the decision of the United States Supreme Court, where the case is now pending, favors the city's contention that the sum awarded is too high, it will be necessary to issue only part of the bonds.

Raises Rate to Reduce Bonded Debt

Poughkeepsie, N. Y.—The Board of Public Works has adopted a resolution raising the water rates in this city with the idea of canceling the bonded indebtedness of the water works. The new rates are:

No bill for water for three months' service, including the use of the water meter, shall be less than $1.25 therefor—a minimum rate of $1.25. This rate refers to each service or where more than one family receives water from the service, to each family.

From minimum bill to 5,000 cubic feet quarterly, $1.50 per thousand; old rate, $1.25.

From minimum 5,000 to 10,000 cubic feet quarterly, $1.25; old rate, $1.

From minimum 10,000 to 20,000 cubic feet quarterly, $1; old rate, 70 cents.

From minimum 20,000 to 40,000 cubic feet quarterly, 70 cents; old rate, 40 cents.

From minimum 40,000 to 80,000 cubic feet quarterly, 50 cents; old rate, 30 cents.

Over 80,000 cubic feet quarterly, 40 cents.

The Common Council has been notified that the rate established will apply to water used at all public buildings, fire houses and schools, and that arrangements must be made for installation of water meters, and the hydrant charge, amounting to $8 per year per hydrant, will be made against the Common Council. The Superintendent has been instructed to have meters installed on all services and do away with all faucet rates and special rates, and to have meters placed on all services made use of by the Board of Public Works at its pumping station, parks, fountains, watering troughs, and to measure all water used on the street in flushing, construction work of all kinds and to be charged to the respective funds.

Effects Saving of Water

Washington, D. C.—Consumption of water at the Bureau of Fisheries has been reduced 46 per cent, effecting a saving to the District of 101,060 gallons of water per day, as the result of work of the Water Department officials, according to a report made to the Commissioners. Tests were made by the pitometer operators in the vicinity of the Bureau of Fisheries some weeks ago indicating that there was an excessive use of water in that government building. George M. Bowers, Commissioner of Fisheries, was asked by the Commissioner to co-operate with the Water Department in an effort to locate the leak and thus effect a saving of water. Mr. Bowers acceded to the request and tests were at once begun.

Water Works Operated for Hundred Years Abandoned

Philadelphia, Pa.—Philadelphia's oldest water works, at Fairmount, hoary with the weight and toil of 100 years, were put out of commission Feb. 19. The great turbine wheels that have pumped from the Schuylkill nearly 8,000,000,000 gallons of raw water annually were silenced forever, and filtered water displaced the raw water in the Fairmount district. At the same time the Spring Garden steam-driven plunger pumps also were stopped, and that district was added to the filtered water zone. Unlike the Fairmount turbine water wheels, however, the machinery at the Spring Garden station will be maintained in serviceable order for emergency purposes. On Feb. 20 filtered water from the mammoth filtration plant at Torresdale flowed through the network of water mains that gridiron the northeastern wards, all of the wards east of Broad street, to Callowhill street, and every ward south of Callowhill street, between the Delaware and the Schuylkill Rivers, to the lowlands above League Island, more than 18 miles in a straight line from Torresdale.

Water Company Makes Price to Knoxville

Knoxville, Tenn.—The Knoxville Water Company has proposed to sell its plant to the city of Knoxville for the sum of $1,250,000. It is also stated that the special committee of the City Council, which has been negotiating with the water company, has asked Owen Ford, water engineer, to come to Knoxville and estimate the actual value of the plant.

Plan Saving in Land Condemnation

New York, N. Y.—A bill to permit the city to purchase awards for property taken for the Catskill water works without going to the expense of carrying through protracted condemnation proceedings has been introduced in the Legislature by Senator Wagner, Manhattan. The saving to the city, Mr. Wagner estimates, will be considerable. The measure, which is advocated by the city administration, permits the city to purchase direct from the owner, after condemnation proceedings have been commenced and before the award is confirmed by the court. The moment the award is purchased, condemnation proceedings are to cease.

STREET LIGHTING AND ELECTRIC POWER

Inverted Gas Lamps in Boston

Boston, Mass.—The new inverted gas lamps on Commonwealth avenue, between Arlington and Berkeley streets, have been lighted, with excellent results. An opportunity is given by permission of Mayor George A. Hibbard and Superintendent Guy C. Emerson, of the Street Department, to compare the value of the new style of gas lamp with that of the arc lights. The demonstration was arranged by the Boston Consolidated Gaslight Company, although that company does not bid for the street lighting contract. It is claimed that the inverted lamp will bring about a saving of at least $100,000 a year in the lighting cost of the city. The light is steady and gives to that part of Commonwealth avenue where the lamps are installed a brightness that is in sharp contrast to the other parts of the thoroughfare. Iron posts have been erected especially for the new lamps on both sidewalks. The arc lights are located in the parkway, so that a comparison can be made readily. Since last spring the gas company has been giving the inverted lamp a test in front of its premises on West street, and, finding it satisfactory, the larger number was placed in the Back Bay.

Cannot Build Plant to Light Its Streets

Oshkosh, Wis.—Judge Burnell, in Circuit Court, has handed down one of the first decisions given by a Circuit Court under the new public utilities law. The decision is considered important also as it is the first to determine the rights of cities under that law. The city of Chilton, in spite of the new law, contended that it had the right to build a plant to do the lighting of its City Hall and streets. The court held that for the city to build a plant to light its own buildings and its streets would be the creation of a public utility and that the city could not do so without the consent of the Railroad Commission.

Bucyrus Gives up Municipal Plans

Bucyrus, O.—After having voted for a municipal lighting plant and been enjoined from issuing the bonds, the City Council of Bucyrus opened bids for lighting the city by private enterprise, granted a franchise, awarded and signed a contract, all within two hours. The price is $74.50 per arc lamp on an all-night schedule and $69 per lamp on a moonlight schedule. The new plant is to be in operation within eight months. The present company also bid, but its bid was thrown out as irregular.

Halts the Plans for the City Lighting

Milwaukee, Wis.—The threatened Neacy injunction, halting Milwaukee municipal light plant plans, has been served on the city. It restrains Milwaukee from further issuing bonds or in any way proceeding with the erection of a plant until the courts shall have decided that such plant is necessary, legally authorized and practical.

Automatic Gas Lighting Not Satisfactory

Paterson, N. J.—Ever since the gas lamps in the streets have been equipped with the automatic lighting devices there have been complaints from all sections of the city to the effect that they did not do the work they were required to do, and that in many places the lamps were burning in the day time while others were out at night. Mayor Andrew F. McBride has written to the gas company requesting that the automatic clock arrangements be removed. He says the system was introduced without the consent of the city, and that it does not accord with the contract, which was to "allow a free flow of the illuminating material and permit a full and normal flame," and besides is a direct violation of the clause which says that the lamps shall be lighted by a lamp lighter.

Midroadway Lighting at National Capital

Washington, D. C.—For experimental purposes a new system of street lighting is to be installed along Massachusetts avenue, between Ninth and Fourteenth streets. The plan is to erect posts in the middle of the street, which will support large arc lights. It is believed this plan can be successfully carried out on broad thoroughfares like Massachusetts avenue, and that it will light such streets better than curb lamps. Seventeen lamps are to be erected on Massachusetts avenue. They are to be protected by square sand boxes, forming isles of safety at their bases. The wires for supplying current to the lamps are to be run in the trees, with taps out to each lamp. Extra precautions are to be taken not to injure any tree.

Proposed Gas Reforms Consolidated in One Bill

Washington, D. C.—Congressman Sims has introduced a new gas bill, practically a consolidation under one head of all propositions now pending before Congress affecting the Washington and Georgetown Gaslight Companies. The new bill reduces the price of gas in the District from $1 to 90 cents a thousand cubic feet, reduces the legal candle-power to 18 from 22 and repeals section 5 of the gas act of 1896 (the stock inflation clause). The bill provides for ascertainment of the value of the gas properties by a judicial review, exclusive of the good-will and franchise, which are not to be included as tangible assets. It authorizes the issue of additional stock up to the valuation so determined by judicial review, and makes the Commissioners of the District party to the proceedings, with right of appeal to the Court of Appeals and thence to the Supreme Court of the United States. The measure further provides for a 6 per cent dividend on the stock so issued, which dividend may be increased 1-20 of 1 per cent for every cent of reduction in the price of gas per 100,000 feet from the rate fixed by the bill. If the profit exceeds the dividend authorized the company may accumulate not exceeding 5 per cent of the par value of the stock issued as a fund for such purposes as are necessary in the conduct of the business. A system of accounting is provided for similar to that recommended by the New York Public Utility Commission. The company is authorized to acquire coal lands, etc.

FIRE AND POLICE

New Water Plant and Firemen Do Good Service

Brunswick, Md.—The first fire here since the installation of the new water plant started in a house in what is known as "Ten Row," the building being of frame construction. These ten houses are occupied by Italians and negroes. The newly organized fire company gave excellent service, confining the fire to the house in which it originated and extinguishing the fire in about 15 minutes. The citizens of Brunswick are highly elated over the new water plant.

Police Will Urge Amendments to Laws

Fort Worth, Tex.—Chief of Police James H. Maddox appeared before the Legislature at Austin recently in behalf of legislation affecting the State Chiefs of Police. Chief Maddox is the Chairman of the Legislative Committee, appointed at the meeting of the Chiefs of Police Association held here recently. This committee is urging the passage of laws affecting the anti-pass law, vagrancy law and the ownership of burglars' kits. The Police Chiefs hope to secure the passage of an amendment to the anti-pass law which now excludes the Chiefs of Police and the City Marshals. On the vagrancy law they ask the Legislature to adopt the law now in force in Louisiana. In connection with the other matter they ask that an act be adopted making it a felony for a man to have in his possession a kit of burglar's tools.

Uniform System for Gas Cut-offs

Kansas City, Mo.—To have a uniform system of gas cut-offs is the plan of the Fire Marshal; it would be of great advantage to the property owners as well as the Fire Department. The Fire Department does not have a record of any kind showing the location of the gas cut-off boxes, and when a fire breaks out it is necessary for a search to be made before the valve can be found. At a recent fire a Captain and a Lieutenant under the first orders of the Fire Chief hunted all over and through the cellar of the building, including a hunt around the curbing, for the valve to cut off the gas supply. But it was not to be found and the building chemist as well as the owner himself knew nothing of the whereabouts of the cut-off box. It was found at last by a man who lost his life in the search. In many of the business buildings in the city the cut-offs are down in the cellar—a most dangerous place to roam during the progress of a fire. Sometimes it can be found under a platform or a porch of some kind. There is no uniformity whatever in the situation of the valve and this is what the Fire Marshal would like to see. Two good rules to follow when the house gets on fire is to first telephone and then run to the cellar and shut off the gas—if it is possible to do the latter.

Louisville Police Must Be Neat

Louisville, Ky.—An order from Chief of Police Haager has been issued to the Police Department requiring the officers and men to present a good front to the public in the matter of attire. Under this order patrolmen are forbidden to come on duty unless they are clean shaven and have their wearing apparel in correct form and their shoes blacked. Patrolmen and officers are not permitted to wear wornout uniforms, but are expected to get new ones when the old ones are rusty. Chief Haager says the officers should try to win the admiration and respect of the public by their appearance while on duty.

Medal for Economy and Efficiency

Louisville, Ky.—The Board of Public Safety, with the cooperation of the Mayor and Chief of the Fire Department, has agreed to give to the Captain of the Fire Company making the best record for economy in the management of his house, without impairing the efficiency of his company, a handsome solid gold medal appropriately engraved. The medal will be given by the Board of Public Safety next September, after the September inventory has been ciphered out and put upon the records. It must be understood among the captains that the competition must be fair and square in every respect, and that the inventories must be accurately and carefully taken.

Record for Hose Coupling Broken

Gloucester, Mass.—With never a sign of a hitch in their work from start to finish, and winding up with a rare sprint, Kelly and Slade, of South Framingham, broke the world's record for the hose coupling game, with straight couplings, and incidentally took first money at the hose coupling contest at City Hall, Gloucester, Mass. The official time was 12 1-5 seconds. As an amusing sideshow, a burlesque contest was given by two firemen, whose difficulties were much appreciated by the audience.

Assistant Chiefs to Be Chosen by Examination

Minneapolis, Minn.—Hereafter, instead of appointments being made, regular examinations will be held for Assistant Fire Chiefs in which all Fire Captains who have been Captains for five years or more will be eligible to participate. According to Commissioner Michael Carpenter, in order to test their ability, captains will be appointed temporarily to fill the vacant places now existing.

Plan to Assess Cost of Fire Protection

St. Louis, Mo.—Proposing to meet the demands of certain manufacturers for a reduction in water rates from the city's municipal plant, Water Commissioner Ben C. Adkins proposes to adopt a system of assessment to collect from the city for water furnished for fire protection, that the reduction, if it comes, will not affect the income of the department. The city is now getting pressure for fire protection through 10,000 fire plugs without charge, that being counted as part of the expense of maintaining the water works. If the manufacturers continue to insist on cheaper water through meters, Mr. Adkins proposes to change the water revenue system and collect a real estate tax for fire protection, aggregating about $400,000 a year, or 10 cents per $100 on the real estate assessment of $400,000,000. Adkins says the owner of a $50,000 residence is now paying as much for fire protection as the owner of the $1,000,000 office building, but he says the real estate assessment plan would equalize the cost by making the owner of the $1,000,000 office building pay 20 times as much for fire protection as would the owner of the $50,000 residence. Manufacturers are paying 8 cents per 1,000 gallons. They want the rate reduced to 4 cents.

Motor Fire Engine Has Lively Day

Trenton, N. J.—The Webb motor fire engine was exhibited in Trenton on Washington's Birthday. The motor machine was stationed at Engine House No. 1. At a given signal, the steam engine and the Webb engine started for the Battle Monument. In two minutes the Webb arrived at the scene, two minutes ahead of the steamer. The Webb threw a 1¼-inch stream over the monument, 160 feet high. The steamer stream came four minutes later and reached a height of 125 feet with a 1½-inch stream. Later the motor engine dashed down-town and threw a stream over a nine-story building. In the afternoon the engine went to Princeton, 11 miles away, and was in actual operation 18 minutes after leaving Trenton.

Police Regulations to Be Revised

Washington, D. C.—Upon the recommendation of Commissioner West, the District Commissioners have decided to appoint a board to revise the police regulations so that they will be up-to-date. The board is to be composed of the Corporation Counsel, the Major and Superintendent of Police, the Chief Clerk of the Engineering Department and the Secretary to the Board of Commissioners. In urging the revision of the police regulations, Commissioner West said: "Since the last edition of the police regulations was published 111 amendments have been made to them. Many of these amendments modify the regulations to which they relate in a very complicated manner, so that it is difficult even for one familiar with them to avoid mistakes. Some of the regulations are obsolete. In some instances the same objects that should be treated separately are in the same article. There are regulations which are obscure and conflicting, and some whose validity has been impaired by judicial decisions."

GOVERNMENT AND FINANCE

Indianapolis to Have Nine Councilmen at Large

Indianapolis, Ind.—A sharp contest occurred in the Senate over Senator Cox's bill, which would reduce the number of Councilmen in Indianapolis to nine, all of them elected at large. An effort was made to amend the bill by making the number of Councilmen fifteen and electing them by wards, but it was defeated. An amendment to the bill provides that no party shall have the right to nominate more than six candidates for Councilman. The object of this amendment is to keep both of the two leading political parties in power to some extent all of the time, so that no one party would have absolute control.

City Salaries Unchanged

New York, N. Y.—In the calendar which faced the Board of Estimate at a recent meeting were many resolutions calling for increasing salaries of city officials and creating of new jobs. Among these were proposals to increase the salary of Fire Chief Croker from $7,000 to $10,000 a year and of Sanitary Superintendent Walter Bensel, of the Board of Health, from $5,000 to $7,000. The resolutions also provided for several new offices in the Finance Department. In not a single instance was the necessary number of votes obtained for the passage of a resolution.

Municipal Court for Philadelphia

Philadelphia, Pa.—Ex-Judge Abraham M. Beitler addressed the City Club recently upon "The Advantages of a Municipal Court," basing his conclusions upon the experiences of Chicago in recent years. Since the introduction of this court, said ex-Judge Beitler, trial by jury has almost been done away with in Chicago, except in the most serious cases. In 1908 95 per cent of the civil cases were decided by a Municipal Judge, and of the criminal cases 99 per cent were tried by the judge, only 1 per cent of the defendants electing to be tried by a jury. The result had been a very great improvement in the promptness and carefulness with which the law had been administered, the average time elapsing between arrest and the final disposition of a criminal case being only two weeks. Steps will immediately be taken to carry out the suggested reform.

Board of Contract and Supply Proposed

Providence, R. I.—Mayor Henry Fletcher sent to the City Council at the last meeting of the Board of Aldermen a message recommending that the City Solicitor be instructed to apply to the State Legislature for authority to pass an ordinance creating a Board of Contract and Supply to make all purchases of supplies and award all contracts in excess of $500 on behalf of the city and to purchase all lands or real estate for the city. In his message the Mayor recommends that "improved methods be instituted by the city to safeguard its interests relative to the purchase of land and the making of contracts for the performance, the furnishing of materials and relative to the purchase of supplies," and adds: "The present method whereby the duties and responsibilities incidental to such lines of activity are placed here and there among numerous departments of the city is, in my opinion, outgrown, and I believe that there should be a general board to act for the city in such matters." The accompanying ordinance, which was referred to the Committee on Ordinances by the Board of Aldermen, provides that the personnel of the Board of Contract and Supply shall include the Mayor, President of the Board of Aldermen and President of the Common Council, City Auditor, Commissioner of Public Works, Chairman of the Board of Police Commissioners, Chairman of the Board of Fire Commissioners, and in case of the purchase of land, the Chairman of the Board of Tax Assessors. This step follows closely a municipal investigation into the purchase of lands for school house purposes at exceptionally high figures some months ago.

Sheriff Seizes Mayor's Chair

Winnipeg, Man.—Sheriff Inkster seized the Mayor's chair at the City Hall recently to satisfy a judgment obtained by Okely Brothers, contractors for one of the city bridges.

Charlotte to Try Commission Form of Government

Charlotte, N. C.—This city is the latest to endeavor to pattern its government after what is commonly known as the Galveston Commission plan, although with considerable modification of the scheme of government employed in the Texas city. The experiment is being closely watched by other municipalities throughout the South. After three months of discussion, not without some wrangling, a compromise city charter has been agreed upon, and the present Legislature will be asked to grant it to the municipality. It provides that the city be governed by a single Board of Aldermen, elected at large, without regard for geographical lines within the city limits, and that they be empowered to elect the Mayor from one of their number. The Aldermen are to be seven in number, and in their hands will vest the entire control of the city. They will appoint the Chief of Police and other officials, will assess and collect the taxes and administer all municipal affairs. The one suggestion of the radicals that was defeated was the embodying in the proposed charter of an article giving to the Board of Aldermen a wider authority for regulating public service corporations than the city now enjoys. This was defeated after a spirited debate.

City Ownership Profits

Westfield, Mass.—That municipal lighting plants can be run at a profit is shown by the annual report of the municipal plant in Westfield, which has just been issued. The profit on the gas plant last year was $13,158 and on the electric plant $11,580, making a total profit of $24,738. This is on a plant the total cost of which to the town, including the original cost and all additions, has been $249,087. The past year has been the most successful in its history. For a long time the plant was the only paying municipal lighting plant in Massachusetts.

REFUSE COLLECTION AND DISPOSAL

Seek Clean Streets

North York, Pa.—Council has decided to prosecute all residents of the borough who in the future persist in throwing garbage upon the borough's highways. Councilman Herman reported that he had consulted the Borough Attorney in reference to the depositing of garbage upon the streets. The Attorney advised, he said, that action be taken against all offenders according to ordinance and in the absence of an ordinance the Borough Council should act under the provisions of an act of Assembly. The Highway Committee was instructed to notify all offenders to discontinue the practice of throwing garbage upon the streets or action would be taken according to law.

Refuse Crematory Burned

Washington, D. C.—The crematory used for the destruction of the city's refuse, located on the west bank of the Eastern branch near Twenty-sixth street and Benning road, was burned about midnight, February 19. The flames had gained so much headway by the time the firemen reached the scene that it was impossible to save the building and machinery. The fire, it is believed, was caused by spontaneous combustion, and the damage is estimated at about $12,000. Pending the rebuilding of the plant, which will be of iron and concrete, garbage will be burned on the marsh, at a point near where the crematory was located.

RAPID TRANSIT

Trolley Charters in Connecticut

Hartford, Conn.—The Railroad Committee of the General Assembly has adopted a rule declaring that the granting of charters for trolley franchises and for extension of time on existing franchises must be in comformity to the general law of the State. The committee, explanatory of its action, says that it is desired to put an end to the granting of trolley franchises by special legislation, which means in the past have been used by promoters to float stock of companies which were on paper, or to water stock of existing companies. The committee will limit the time of extension of charter rights of companies which have not yet built one-fourth of their authorized trackage. This is to stop what is called "dog in the manger"

franchises. No more "blanket" franchises will be granted this session, and companies having such franchises and asking for further extensions must give a detailed statement of the condition of property developed under rights already granted.

Asks Six-Track Subway

New York, N. Y.—The Public Service Commission has submitted to the Board of Estimate a plan for widening to six tracks that part of the bridge subway loop from Pearl Street to the Brooklyn Bridge using the extra trackage at Bridge Station. To carry out this project it will be necessary to acquire more land, but a plan has been worked out by the commission whereby the city, by constructing columns of sufficient strength to support buildings to be erected for office purposes on the ground not needed for the municipal building, can make the extensions without a large outlay of money. It is estimated that the additional property needed to be condemned for the six track station will cost about $1,000,000. The expense of constructing the two extra tracks will be about $550,000 and the strengthening of the subway to bear the weight of buildings on the parts of the site not required for the new municipal building will cost about $325,000. It is the belief of the Commission that the city will be able to sell or to lease these sites at a price which will more than reimburse the outlay.

MISCELLANEOUS

Would Publish Department Reports Separately

Harrisburg, Pa.—Common Council has received a suggestion from Secretary James A. Bell, of the Board of Trade, to the effect that the annual reports of the municipal officers be published in pamphlet form instead of in one bulky book. The secretary of the Board of Trade believes that the postage saved in mailing the pamphlets would more than make up the difference in cost in publishing the reports in one book, and Mr. Bell states that other cities often ask for the report of only one or two departments, and that, as the reports are now published all together, the entire city reports have to be sent to the officials asking for information. At present, Mr. Bell points out, it is nearly a year before the annual reports are published. He adds that if the pamphlet form were adopted the reports of the various officers could be published within thirty to sixty days.

Tenement House Law Under Consideration

Louisville, Ky.—The Board of Aldermen is considering the tenement house inspection ordinance. Under its provisions the Mayor will be authorized to appoint a commission to carry out the plans for better sanitary conditions in tenements and providing for better construction of tenement houses in the future. The commission will consist of thirty men.

Mr. Davis, who drew up the ordinance, says:

"We have found places where from forty to fifty people are using one single small sink, while they dwell in somber, poorly-ventilated, badly-lighted rooms. We have found places where only a transom furnishes the light and the air; we have found places where from eight to ten people sleep in a murky, close, foul-smelling room, with no more ventilation than a window opening out into an eighteen-inch open space between buildings. We have found alleys where there is not a single sewer tap, not a single water connection, and where the offal of the entire alley is dumped upon the surface in the gutters to scatter germs of disease throughout the city. What a thorough, systematic investigation would disclose is not known."

The proposed commission will use a well-tried system of investigation. It will be a card-report plan, which will be compiled as the reports are filed, with a view to correcting the conditions. The city, or that portion of the city where the tenements are situated, will be divided into districts and allotted to certain members of the commission. They will be expected to inspect, with the authority of the Health Officer, all tenement houses and congested conditions in their district.

Vehicle Tax Bringing Increased Sum

Columbus, O.—Although the City Auditor has been receiving the vehicle tax for only about ten days, more than $5,000 has been paid in, and the number of applicants is increasing every day. It is estimated from the early receipts that the revenue this year will be the largest since the law was passed, and will be sufficient to keep the streets and alleys of the city in good condition, without any other funds being contributed by the city from other departments.

City Must Own Water Front

Cleveland, O.—The supervising architects of the group plan of city development, John M. Carrere, Arnold Brunner and Daniel H. Burnham, recently held a conference at Cleveland. They outlined their general ideas for the improvement of the lake front from East Ninth street to Gordon Park. These call for the construction of a boulevard out to the harbor plan over several miles of made land. The supervisors are still of the opinion that the depot should face the group plan. They urged the desirability of the city getting control of the lake front. They stated that New York as well as many European cities is spending millions to gain control of its docks.

Invite Suggestions Regarding Building Ordinance

Haverhill, Mass.—A building ordinance drafted by Inspector of Buildings Robert H. Mitchell, before its passage, will be placed on file in the City Clerk's office for ten days. Contractors and others interested are invited to examine the ordinances and make suggestions. The object of this is to make the provisions of the ordinances reasonable and acceptable and thus save the possible expense of a referendum election which might be necessary if serious objection should develop against the ordinance.

Detroit Will Consider City Plans

Detroit, Mich.—The civic beautifications committee, consisting of Paul C. Renaud, Charles Moore, Frank C. Baldwin, F. G. Ryan and J. M. M. Grylls, and acting in conjunction with the parks and boulevards committee, will submit to the Common Council a proposition empowering the Mayor to appoint an honorary and unsalaried commission to consider plans for the beautification and improvement of the city. Mayor Breitmeyer has promised that he will incorporate an item of $5,000 in the parks and boulevards budget to defray the expenses of the commission, according to Paul C. Renaud, member of the committee. At a meeting of the civic beautification committee in the City Hall a resolution requesting the Common Council to pass an ordinance authorizing the Mayor to appoint a commission of nine, specified that two of the members should be proposed by the Board of Commerce, two by the Michigan chapter of the American Institute of Architects, and five citizens at the discretion of the Mayor. The commission's jurisdiction is defined as "the investigation of all phases of the city's future development and beautification, and to secure through the aid of experts on municipal architecture a comprehensive plan as a guide to future operations for the location of new parks and boulevards, the improvement of the river front, the location of playgrounds, public buildings, etc."

Engineer Saves Ten Thousand—Gets Three Hundred

Madison, Wis.—After a lengthy discussion Council has decided to increase the salary of City Engineer J. F. Icke from $1,500 to $1,800. It was stated that the City Engineer had saved the city about ten thousand dollars during the last year. He completed an abandoned street improvement contract, saving $6,500. He made the city quarry earn nearly $600, whereas it had formerly lost money. The salary of the Chief Engineer, James Maclean, at the scrap disposal plant, was also increased as a reward for economies effected there.

LEGAL NEWS

Summary and Notes of Recent Decisions—Rulings of Municipal Interest

RESPONSIBILITY FOR DEFECTIVE STREETS

Cox vs. **City of Philadelphia.**—The fact that a city kept an inspector on the ground where a contractor for a street railroad company was working, who pointed out what he deemed dangerous places made in the streets by the work, for the protection of persons using the streets, but who had no power to interfere with the contractor or direct his employees, did not render the city liable as a principal for an injury resulting from an excavation or depression caused in a street by the contractor.—United States Circuit Court.

COMPULSORY LABOR ON STREETS

Town of Winnfield vs. **Long.**—Statute 136 of 1898, relating to the government of municipalities, contains no delegation of power authorizing those municipalities falling within its provisions to compel persons under their ordinances to work on the public streets. Such ordinances are null. No implied power authorizes the adoption of such ordinances. They must be adopted under an expressed grant of power. The laws relating to parishes and work on public roads have no application. Municipalities and parishes are governed under their respective delegated powers. The municipality collects taxes, part of which (instead of requiring persons to work on the streets) is to be applied to the repair and maintenance of streets.—Supreme Court of Louisiana.

TAXATION OF RAILROAD PROPERTY

City of Bessemer vs. **Southern Railway Co.**—Bessemer City Charter, authorizing the City Tax Assessor to ascertain the length of any railroad in the city, the number of engines and cars in the city, etc., to make an assessment of the property of such company in the city, basing the valuation of the assessment of the railroad for State and county taxes for the previous year, and "at as nearly the same rate as the State Board as he can," is void, as contrary to Constitution, providing that no city shall levy a higher rate of taxation in any one year on the property situated therein than one-half of 1 per cent. of the value of such property as assessed for State taxation during the preceding year.—Supreme Court of Alabama.

MUNICIPAL ORDINANCE WITHOUT TITLE

Sample et al. vs. **Town of Verona.**—The provisions of Constitution 1890, that every legislative act shall have a title indicating the subject-matter, are mandatory. A municipal ordinance adopted without any title, in violation of Code 1906, is invalid; the requirements of the Code that the subject-matter must be clearly expressed in the title being mandatory. A municipal election is included in the phrase "at any election," as used in Code 1906, making illegal voting at any election an indictable offense.—Supreme Court of Mississippi.

BONDS—VALIDITY

State ex rel. Utah Savings & Trust Co. vs. **Salt Lake City et al.**—The fact that an ordinance providing for an election in a city to determine the question of the issuance of bonds for a water supply and sewers declared that the net revenue from the water system should be set apart for a sinking fund for the payment of the bonds, while Compiled Laws 1907 expressly provide that the City Council shall annually levy a tax to pay the interest and to provide a sinking fund for the payment of the bonds, did not affect the validity of the bonds authorized, for the erroneous statement in the ordinance was, at most, an irregularity which did not affect the validity of the election, in the absence of a showing that any of the voters were, in fact, induced by reason of such improper statement in the ordinance to vote for bonds.—Supreme Court of Utah.

SPECIAL ASSESSMENT—RELIEF AWARDED

Hedge vs. **City of Des Moines.**—Where a city erroneously assessed special benefits on property in excess of 150 feet in depth, and on appeal from the assessment the court orders a reassessment to be made to the extent of 150 feet depth, and, on a further appeal, the city does not complain in its opening argument of this decree, the Appellate Court will confirm the original assessment by the City Council to the extent of 150 feet depth and cancel as to the excess, and the tax as confirmed will draw interest as from the date of its original delinquency, but will carry no penalties to the time of decree.—Supreme Court of Iowa.

SEWER IMPROVEMENTS—OBJECTIONS

City of Pueblo et al. vs. **Colorado Realty Co. et al.**—Laws 1899, subd. 5, provides that, on petition for a sewer improvement, the City Council shall make a preliminary order, adopting specifications showing the nature of the improvement and the estimated cost. Subdivision 6 provides for publication of notice to property owners, and for objections to the improvement. Section 20 provides that after a part of the sewer is completed and accepted, the City Engineer shall prepare a statement showing the cost and the amount apportioned to each tract of land to be assessed, which must be filed in the office of the City Clerk. Section 21 provides for publication of notice to property owners, and section 22 provides that after the period specified in such notice, the City Council sitting as a Board of Equalization shall determine all objections, and shall then by ordinance assess the cost of the improvement against the property affected. Held that, where property owners appeared and filed objections to the improvement and assessment, as provided by section 22, they lost none of their rights by their failure to object to the preliminary order, as provided by section 3. —Supreme Court of Colorado.

SEWER CONTRACT—PAYMENT

Broad vs. **City of Moscow.**—Where a contract is entered into for the construction of sewerage works, under the provisions of the act of February 20, 1903, to be paid for by special assessments, the contractor must look to the property of said district for the payment of the contract price, and, if the city or village authorities fail to deliver the bonds agreed to be delivered in payment of the contract price, the remedy of the contractor is against such officers to compel them to perform their duty, and no right of action lies against the city for damages for failure to deliver such bonds.—Supreme Court of Idaho.

FLOODING CELLARS—LIABILITY

Punsky vs. **City of New York**—In the absence of negligence in the manner of collecting water and furnishing outlet therefor through culverts or sewers, a city is not liable for damages from the flooding of a cellar, caused by the natural flowing of water along the street after a heavy downpour of rain. Evidence in an action against a city for damages to property by the flooding of a cellar examined, and held to show that plaintiff's claims were exaggerated and groundless.—New York Supreme Court.

LIQUOR ORDINANCE—EVIDENCE

Barron vs. **City of Anniston.**—Where, on a trial for selling whisky in violation of a city ordinance, a witness testified, describing an interview with defendant, that when he called defendant from his room he paid him for whisky he had bought earlier that day and told him he wanted another pint, a motion to exclude the statement about paying for the whisky previously bought was properly overruled, since it was a part of the res gestæ, and such action would have left the sentence without meaning. A prosecution for the violation of a city ordinance, though not strictly within the definition of a criminal case, because the offense is not against the state in its sovereign capacity, partakes of the nature of a criminal prosecution and is subject to the same rules of evidence, since the city is one of the governmental instrumentalities, clothed with a part of the sovereignty of the state; and this is especially true as to offenses punishable by imprisonment or hard labor.—Supreme Court of Alabama.

ORDINANCES—ADVERTISEMENT

Eggers et al. vs. **Mayor, Etc., of City of Newark et al.**—If a party to a cause is asserting a legal right in a lawful manner, his motives and the underlying reasons for his action are immaterial in law. The by-law adopted by the Board of Street and Water Commissioners of the city of Newark, pursuant to legislative authority, which by-law requires advertisement between first and second reading of ordinances not based on "notice of intention," could not, at the time of action by the said Board on the ordinance brought up in this case, be suspended so as to render advertisement unnecessary and permit the introduction and passage of the ordinance at the same meeting.—Supreme Court of New Jersey.

PERSONAL INJURY—PARK WAGON

Silverman vs. **City of New York.**—A person seated in a city park in broad daylight on a bench provided by the city for public use had a right to assume that a city employee driving a rubbish wagon would exercise ordinary care to avoid injuring him, and was not required to keep a lookout for approaching wagons.—New York Supreme Court.

SIDEWALK ORDINANCES—SUFFICIENCY

City of Bluefield vs. **McClaugherty.**—An ordinance of a City Council or Board of Supervisors of a city having statutory authority to cause property owners to pave sidewalks at their own expense, which requires a property owner to lay "granolithic" walk on a street on another portion of which such walk is already laid, and saying the walk to be laid "shall be the same width as the granolithic walks which have already been laid" thereon, suffices for recovery of the cost of laying the walk by the city on default of the property owner, although it does not specify the composition of such walk. A resolution, so passed, or order, so made, requiring plank walks to be laid on certain streets, and saying "all of said plank walks to be six feet wide and in accordance with specifications to be furnished by the City Engineer and ordinances of the city," is construed as referring to specifications already prepared and filed in the City Engineer's office and shown by ordinances previously adopted, and is sufficient.—Supreme Court of Appeals of West Virginia.

REMOVAL OF SHADE TREES

City of Paola vs. **Wentz.**—Assuming that the question whether a shade tree growing in the street should be removed is one to be determined by the city officers, not subject to review by the courts, yet, in order for their determination to be conclusive, it must be made fairly and in good faith. If made arbitrarily action under it may be enjoined as an abuse of discretion. The officers of a city may not against the objection of the abutting owner remove a shade tree from the street merely for the sake of enabling them to place a sidewalk in a position different from that prescribed by ordinance. The removal by officers of the city of shade trees growing in the street may be enjoined where the only reason offered to justify such removal is insufficient as a matter of law, and no other purpose is disclosed.—Supreme Court of Kansas.

RETARDING FIRE DEPARTMENT

Houren vs. **Chicago, M. & St. P. Ry. Co.**—The Fire Department, while hurrying to extinguish a conflagration, was delayed for about 30 minutes by a train of cars which had been left standing across a street. During this time the house of respondent took fire from one nearby. The railroad was sued for the destruction of respondent's house, which it was alleged was caused by the inability of the fire engines to reach it in time. It was contended that the fire, and not the obstruction of the street, was the proximate cause of the destruction of the building, and that there was no proof that the firemen would have been able to prevent its demolition had the delay not occurred. The court held that the obstruction was a concurrent cause of the burning, and that, although absolute proof of the result of the efforts of the Fire Department could not be offered, it was reasonable to expect that it would have been able to prevent the spread of flames, especially as all the paraphernalia for fire protection was available.—Supreme Court of Illinois.

BONDS—VALIDITY

Town of Fletcher vs. **Hickman.**—Under Mills' Annotated Statute, Colorado, 1891, providing that municipal ordinances shall be recorded in a "Book of Ordinances," which record shall be prima facie evidence that the ordinances were duly published as provided by law, which requires their publication in some newspaper published within the corporate limits of the municipality or, if none, in one of general circulation therein, the burden resting on a town having no newspaper to prove that an ordinance authorizing an issue of bonds and so recorded was not duly published is not sustained by a general statement of a witness that he moved into the town some years after the issuance of the bonds and that there had been no newspaper of general circulation therin "at any time since its incorporation." A purchaser of municipal bonds from a prior bona fide purchaser for value before maturity takes the rights and standing of his vendor.—United States Circuit Court of Appeals.

SNOW—DUTY OF REMOVAL

Kortlang vs. **City of Mt. Vernon.**—It is the duty of a city to keep its walks reasonably free from ice and snow. The failure of a city to remove ice and snow from the walks after notice of its existence, or after time sufficient to justify the inference of knowledge by the city officials, presents a question of negligence for a jury. No duty rests on a city to remove snow from its walks until the snow ceases to fall. A city is not liable for an injury resulting from the icy condition of a walk from melting snow on an adjoining lot, where such condition had existed only three or four days before the accident, during which time the temperature was such as to cause both thawing and freezing each day.—New York Supreme Court.

SEWER OVERFLOW—INSTRUCTIONS

City of Richmond vs. **Wood.**—Defendant city, sued for failure of its sewer to carry off the water in a storm, may not show the storm was extraordinary by testimony of its Engineer as to complaints made to him of overflows of other sewers in other parts of the city at that time; the facts of overflows, and not complaints thereof, being admissible. Where a city sewer becomes choked from want of ordinary care of the city, and such condition is the real and proximate cause of the injury, the fact that there was an extraordinary flood will not relieve the city of liability. An instruction stated that the city was not bound to maintain its sewers so as to meet extraordinary conditions, that it was not bound for damages from overflows from its sewers caused by extraordinary falls of rain, and that if the jury believed that at the time of the damage there was a great rainfall, out of the ordinary course of things, producing a great flood of water [and not an ordinary flood such as might reasonably be expected in this locality and climate], and that, by reason of such extraordinary flood, the damage was caused, they should find for defendant. Held, that the bracketed words were properly interlined. Even if words interlined by the court in an instruction are improper, they may not be complained of by a party who asked an instruction propounding in the same words the proposition announced by such interlineation.—Supreme Court of Appeals of Virginia.

INJURIES—PLEADING

City of Laporte vs. **Osborn.**—Negligence is dependent on a duty owing by defendant to protect plaintiff, failure to perform such duty, and a resulting injury to plaintiff. A complaint for injuries, which plainly and directly avers that the place where plaintiff was injured was a public street, and that plaintiff was a traveler thereon, sufficiently shows the duty owed by the city to plaintiff. It is the duty of a city, owed to the public generally, to keep its public streets in a reasonably safe condition for travel. The term "without," as used in an averment that building material was suffered to remain in a street after night "without" being guarded, is a direct averment that no guards or lights were placed around the obstruction, and the pleading did not merely recite such facts; the word "without" being synonymous with "not being." All that the statute requires as to a complaint is that it shall be couched in such plain and concise language as to enable a person of common understanding to know what is intended. Where it was averred that while plaintiff was driving along the street, without knowledge of an obstruction, and without being able to see it, the horses ran against the same, the facts are directly averred, and the matters following the word "without" are not mere recitals. If the facts averred in a complaint show that an accident occurred in the nighttime, it is a sufficient averment of darkness, and it is unnecessary to aver that the night was dark.—Appellate Court of Indiana.

PERSONAL INJURIES—NOTICE

Higgins vs. **City of Albany.**—Laws of 1898, as amended by Laws of 1904, requires service of notice to the city of an injury received for which a city of the second class is claimed to be liable and notice of the defect claimed to have caused it. Laws of 1886 requires the filing with the corporation counsel of the city within six months after the cause of action shall have accrued of a notice of intention to commence an action. Held, that both notices are conditions precedent to suing the city for an injury and a notice complying with Laws of 1898, as amended, but which contained no statement of an intention to sue, was not a compliance with Laws of 1886, and was insufficient.—New York Supreme Court.

PERSONAL INJURY—DEFECTIVE COMPLAINT

Pullen vs. **City of Butte.**—A personal injury complaint, alleging that defendant city negligently placed a sidewalk in an unsafe, dangerous, and defective condition, and permitted it to so remain, states a mere legal conclusion, and is insufficient for failing to specify in what respect the sidewalk was unsafe, etc., within Revised Codes, requiring a complaint to state the facts constituting the cause of action in ordinary and concise language.—Supreme Court of Montana.

IMPROVEMENTS—INJUNCTION

Goodwin vs. **Mayor, Etc., of City of Millville.**—In the absence of special equities, the Court of Chancery has no jurisdiction over assessments made in the course of municipal improvements, and will not interfere by injunction to restrain the collection of such assessments merely because the complaining party, by his own laches, lost his remedy at law.—Court of Errors and Appeals of New Jersey.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals

ROADS AND PAVEMENTS

Highway Improvements in Allen County, Ind., Methods and Costs of. By G. E. Martin. 1/3 p., Engineering News, Feb. 11. 15 cts.

Road Construction in New Jersey. From Annual Report of Commissioner Gilkyson. Illustrated, 5½ pp., Good Roads, February. 10 cts.

Street of a Thousand Miles. By A. H. Ford. Illustrated, 10 pp., The World To-day, February. 15 cts.

New York State Good Roads. By W. C. Harger. 2½ pp., Good Roads, February. 10 cts.

Road Conditions in East and Middle Tennessee. By M. O. Eldridge. Illustrated, 3 pp., Good Roads, February. 10 cts.

Maintenance of Roads and Pavements by European Countries. Report on International Road Congress. By N. P. Lewis. 4 pp., Engineering-Contracting, Feb. 17. 10 cts.

Road Management and Repair. Paper before Institution of Municipal Engineers. By J. H. Evans. 1½ pp., The Contract Journal, Jan. 20. 20 cts.; 1½ pp., The Surveyor, Jan. 22. 20 cts.

Sand Clay Roads, Construction of. Address before Roads School, Waterloo, Ia. By W. L. Spoon. 1 p., Engineering-Contracting, Jan. 27. 10 cts.

Dust Suppression on Boston Parkways. Paper before International Road Congress, Paris. By J. A. Pettigrew. 1 p., Good Roads, February. 10 cts.

Motor Cars, Methods of Preventing Damage to Road Surfaces by High speed. From report on International Road Congress. By N. P. Lewis. 3 pp., Engineering-Contracting, Feb. 10. 10 cts.

Traffic Census of Illinois Highway. From Second Annual Report of Highway Commission. Illustrated, 4 pp., Good Roads, February. 10 cts.

Street Acceptance Ordinance. Regulations adopted at Pittsfield, Mass. 1/3 p., Municipal Journal and Engineer, Feb. 24. 10 cts.

Planning of Street Work, Early. ¼ p., Municipal Journal and Engineer, Feb. 24. 10 cts.

Brick Pavements of Panama. Illustrated. 2½ pp., Clay Worker, January. 25 cts.

Improved Brick Paving. Illustrated, 2 pp., Clay Worker, January. 25 cts.

Construction of a Brick Pavement along Street Railway Tracks. From paper before Illinois Society of Engineers and Surveyors. By G. C. Fairclo. ½ p., Engineering Record, Feb. 20. 10 cts.

Asphalt Pavement, Cost of Patching. Using small repair plant. By T. E. Petrie. 1 p., Engineering-Contracting, Feb. 10. 10 cts.

Repairs to Asphalt Pavements in Syracuse. 2/3 p., Engineering Record, Feb. 13. 10 cts.

Work of the Municipal Asphalt Repair Plant at Indianapolis, Ind. ½ p., Engineering-Contracting, Jan. 27. 10 cts.

Record of Surface Temperature of an Asphalt Pavement at Waterloo, Ia. By R. B. Slippy. ¼ p., Engineering News, Feb. 11. 15 cts.

Asphalt Testing—Melting Point. Description of different methods and common errors. By Harry Tipper. Illustrated, 2 pp., Municipal Journal and Engineer, Feb. 3. 10 cts.

Bitulithic Pavement Patent Decision. ½ p., Engineering News, Jan. 28. 15 cts.

Court Decision Regarding Bitulithic Pavement Patents. 1 p., Engineering-Contracting, Feb. 3. 10 cts.

Concerning Pavement Patents. Communication from T. H. Boorman. ½ p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Mineral Rubber Pavements of the South Park System, Chicago. Illustrated, 1 p., Engineering Record, Jan 30. 10 cts.

Pavements, Their Object and Desirability. Paper before Iowa Brick and Tile Association. By Paul Beer. 3 pp., Clay Record, Jan. 15. 10 cts.

Street and Sidewalk Pavements. Discussion before League of California Municipalities, 5 pp., Pacific Municipalities, January. 10 cts.

Sidewalks Fail, Why Do? A comparative investigation. 1½ pp., Universal Cement Bulletin, January.

Cost of Street Paving in Fifty American Cities. 1½ pp., Engineering-Contracting, Feb. 3. 10 cts.

Private Use of Street Areas. Account of conditions in Chicago, including charges made for use of space on, below or above the street level. Illustrated, 2½ pp., Municipal Journal and Engineer, Feb. 24. 10 cts.

Bridge Construction in Illinois, Concrete. From report of State engineer A. N. Johnson. Illustrated, 2½ pp., Good Roads, February. 10 cts.

Constructing Concrete Pedestals for a Steel Viaduct. 1 p., Engineering-Contracting, Feb. 17. 10 cts.

SEWERAGE AND SANITATION

Constructing Concrete Sewer in Freezing Weather. Illustrated. ½ p., Engineering-Contracting, Jan. 27. 10 cts.

Construction of Concrete Block Sewer in Toledo, Ohio. By F. I. Consaul. Illustrated, 1 1-3 pp., Engineering News, Feb. 4. 15 cts.

Lawrence Avenue Intake Tunnel, Chicago Intercepting Sewer System. Illustrated. 2 pp., Engineering-Contracting, Feb. 3. 10 cts.

Recent Improvements of Stony Brook, Boston. Illustrated. 2 pp., Engineering Record, Feb. 6. 10 cts.

Cost of Constructing 66-inch brick sewer at Gary, Ind. 1 p., Engineering-Contracting, Jan. 27. 10 cts.

Outlet Sewer System for the city of East St. Louis, Ill., Concrete. By W. A. Thompson. Illustrated. 1/3 p., Engineering News, Jan. 28. 15 cts.

Concrete versus Brick and Pipe Sewers. Report of Committee of Illinois Society of Engineers and Surveyors. 1 p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Protecting Sewers in Alkaline Soils. Communication to Editor. 1/3 p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Joints, Securing Tight Sewer. ¼ p., Municipal Journal and Engineer, Feb. 10. 10 cts.

Sewerage and Sewage Disposal, Practical. By H. C. H. Shenton. 1/3 p., Local Government Journal, Jan. 30. 10 cts.

House Drainage, Modern. By John Lawrence. 1/3 p., Local Government Journal, Jan. 16, 23, 30; Feb. 6 and 13. 10 cts.

Sewage Disposal at Birmingham, England. From report of E. J. Fort. 1½ pp., Engineering Record, Feb. 6. 10 cts.

Notes on British and German Sewage Disposal. From paper before Boston Society of Civil Engineers. By H. W. Clark. 1 2/3 pp., Engineering Record, Jan. 30. 10 cts.

Sutton Sewage Works. Illustrated. 1½ pp., Municipal Journal, Feb. 5. 15 cts.

Sewage Disposal in India. 1½ pp., India Public Health, January. 25 cts.

Treatment of Sewage. Paper before League of California Municipalities. By C. F. Chandler. 5 pp., Pacific Municipalities, January.

Sewage Disposal in Pennsylvania. ¼ p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Percolating Beds for Sewage Treatment. From paper before Institution of Civil Engineers. By Wm. Clifford. 2 pp., Engineering Record, Feb. 6. 10 cts.

Underground Sprinkling Filters. Suggestions regarding New York. ¼ p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Testing Institute for Water and Sewage Purification, Royal Prussian. By A. E. Kimberly. 1 p., Engineering News, Jan. 28. 15 cts.

River Pollution Decision in New Jersey. Significance of recent decision. ½ p., Municipal Journal and Engineer, Feb. 10. 10 cts.

State Control of Water Pollution in Minnesota and Indiana. ½ p., Engineering News, Feb. 11. 15 cts.

Sanitary Science and Engineering. Presidential address before the Institute of Sanitary Engineers. By W. H. Prescott. 4½ pp., The Surveyor, Feb. 5. 20 cts.

Lengthening Human Life in this Country One-third. Abstract of report of Irving Fisher as member of the National Conservation Commission. 1½ pp., American Health, January. 10 cts.

Typhoid, Thirty-five years of. The fever's economic cost to Pittsburg. Illustrated. 17 pp., Charities, Feb. 6. 25 cts.

Notable Typhoid Epidemic at Mankato, Minn. By F. H. Bass. Illustrated. 1 p., Engineering News. Feb. 11. 15 cts.

Modern Conception of Typhoid Fever. 1/3 p., Engineering News, Feb. 4. 15 cts.

Housing and Health with special reference to the lessons from Bournville Village. By J. H. Barlow. 6 pp., Journal of Preventive Medicine, February. 60 cts.

Health, National Bureau of. Communition from Walter F. Willcox. 2½ pp., Charities, Feb. 13. 10 cts.

Pittsburg's Foregone Asset, The Public Health. By S. H. Adams. Illustrated. 11 pp., Charities, Feb. 6. 25 cts.

Milk in Cincinnati, Fight for Clean. 4 pp., American Health, January. 10 cts.

Slaughter Nuisance. D. E. Spahr. 4 pp., Ohio Sanitary Bulletin, December. 15 cts.

Insects in the Transmission of Disease, The Rôle of. By M. A. Brown. 4 pp., Ohio Sanitary Bulletin, December. 15 cts.

Mosquito Extermination in Georgia. ¼ p., Municipal Journal and Engineer, Feb. 24. 10 cts.

Mosquito Extermination in Germany. By Consul-General Richard Guenther. Daily Consular Reports, Feb. 13. 10 cts.

The Use of Abandoned Wells for Cesspools. By F. E. Adams. 1½ pp., Ohio Sanitary Bulletin, December. 15 cts.

WATER SUPPLY

Water Supply to Villages. By S. Barlow Bennett. 1 p., Contract Journal, Jan. 27. 20 cts.

Water Supply of Hythe. Paper before Association of Water Engineers. By Chris. Jones. Illustrated. 5 pp., Water, Jan. 15. 20 cts.

Sketch of the Louisville Water Works. ½ p., Fire and Water, Feb. 10. 10 cts.

Proposed Water Supply for Burwick. 2 pp., Water, Jan. 15. 20 cts.

Ruston, La., Municipal Water and Light Plant. By E. L. Bradford. Illustrated, ¾ p., Municipal Journal and Engineer, Feb. 10. 10 cts.

San Francisco Water Supply and the Yosemite National Park. Communications from R. U. Johnson, J. D. Galloway, C. E. Grunsky. 2½ pp., Engineering News, Feb. 4. 15 cts.

Some of the Broader Phases of the San Francisco Water Supply and Hetch-Hetchy Valley Controversy. 1 p., Engineering News, Feb. 4. 15 cts.

San Francisco's Efforts to Obtain Municipal Ownership of its Water Supply. Illustrated. 4 pp., Engineering News, Feb. 4. 15 cts.

Water Supply of San Francisco. Discussion by F. P. Stearns and C. E. Grunsky, of Association of Engineering Societies. 15 pp., Journal, December. 30 cts.

Combination in Rural Water Supplies. 2 pp., Water, Jan. 15. 20 cts.

Ground Water Depth Measuring. Method and apparatus employed in investigations at Leipzig, Germany. Illustrated, 1 1-4 pp., Municipal Journal and Engineer, Feb. 24. 10 cts.

Circulation of Water in Alluvial Soil. By F. Dienert. Illustrated. 10 pp., La Technique Sanitaire, January. 50 cts.

Examples of Double Wells. By F. G. Clapp. Illustrated. 1 p., Engineering Record, Feb. 20. 10 cts.

Conservation of Water Resources. By M. O. Leighton. 2 pp., Water and Gas Review, February. 20 cts.

Regulation of Stream Flow, Reservoir. 2/3 p., Engineering Record, Feb. 13. 10 cts.

Stream Protection under the Bense Act. By Joshua Hartzell. 11 pp., Ohio Sanitary Bulletin, December. 15 cts.

Dams, Stresses in Masonry. By Wm. Cain. 14 pp., Proc. Am. Soc. of C. E., January. 50 cts.

Safety Factors in Dams. From discussion by J. S. Fielding before Toronto Engineers' Club. 1 p., Engineering Digest, February. 20 cts.

Core Wall in a River Wing Dam at Moline, Ill. Illustrated. 1½ pp., Engineering Record, Feb. 6. 10 cts.

Reservoir at Baltimore, Gate House of the New High Service. Illustrated. ¾ p., Engineering Record, Jan. 30. 10 cts.

Aqueduct, Los Angeles. Account of peculiar conditions and methods of meeting them. Caterpillar traction engines. By E. P. Bailey. Illustrated. 3½ pp., Municipal Journal and Engineer, Feb. 17. 10 cts.

Pump Suction, Screens for. By A. G. Collins. Illustrated. 1 p., Power, Feb. 16. 5 cts.

Foundations for the new building and pump at Lake View pumping station, Chicago. Illustrated. 2 pp., Engineering Record, Feb. 13. 10 cts.

Water Main, Lowering a 30-Inch Cast-Iron, Under a 65-Foot Head. By Thos. Brooks. Illustrated. ½ p., Engineering Record, Feb. 20. 10 cts.

Testing Water Pipe Joints. Experience at Grand Fords, N. D. ¼ p., Municipal Journal and Engineer, Feb. 17. 10 cts.

Meters and Free Water. ¼ p., Municipal Journal and Engineer, Feb. 24. 10 cts.

Water Meters and Public Health. 1/3 p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Water Waste and Meters in Boston. ¼ p., Municipal Journal and Engineer, Feb. 17. 10 cts.

Water Rates. Paper before Indiana Sanitary and Water Supply Association. By F. C. Jordan. 1 2-3 pp., Water and Gas Review, February. 20 cts.; Public Service, February. 20 cts.

Water and Fire Hydrant Rates. Discussion of basis for charges. From paper before Indiana Sanitary and Water Supply Association. By F. C. Jordan. 1 p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Bacillus Anthracoides in Water Supplies. By F. H. Joseph. 4 pp., Journal of Preventive Medicine, February. 60 cts.

Examination of Raw River Water for Typhoid Bacillus. 1 p., Water, Jan. 15. 20 cts.

Purification of Water. Paper before Institution of Mechanical Engineers. By John Don. 1 2/3 pp., Contract Journal, Feb. 3. 20 cts.

Filtration and Purification of Water of Public Supply. Paper before Institution of Mechanical Engineers. By John Don. Illustrated. 4 ½ pp., The Surveyor, January 22, Feb. 5. 20 cts.

Deferrization of Ground Water Supplies. From paper before American Society of Civil Engineers. By R. S. Weston. Illustrated. 2½ pp., Engineering Record. Feb. 6. 10 cts.; 4 pp., Municipal Journal and Engineer, Feb. 3. 10 cts.

Iron Removal Plant of the Shelby, O., Water Company. By Philip Burgess. 2 pp., Engineering Record, Feb. 20. 10 cts.

Purification of Ground Waters. ½ p., Engineering Record, Feb. 6. 10 cts.

Ozone. ½ p., The Contract Journal, Jan. 20. 20 cts.

Recent Experiments in Water Sterilization by Ozone at Paris. ½ p., Engineering Record, Feb. 13. 10 cts.

Sterilization of Water by Ozone. Experiments made in Paris. Itemized results and estimate of cost. 1 p., Municipal Journal and Engineer, Feb. 17. 10 cts.

Purification of Water by Ozone. 1 p., Surveyor, Feb. 5. 20 cts.

STREET LIGHTING AND ELECTRIC POWER

Street Lighting in Boston, Mass. By H. T. Owens. Illustrated. 2 pp., American Gas Light Journal, Feb. 15. 10 cts.

Street Lighting for Bellevue, Ky. Detailed account of costs. ¾ p., Municipal Journal and Engineer, Feb. 17. 10 cts.

Street Lighting in Smaller Urban Districts. By E. F. Wilson. 2½ pp., Surveyor, Feb. 12. 20 cts.; 1 p., Contract Journal, Jan. 27. 20 cts.

Proposed Improvements for Lighting Pennsylvania Avenue, Washington. By W. C. Allen. Illustrated. 1½ pp., The Illuminating Engineer, January. 20 cts.

Field for Electric Street Lighting. 1/3 p., Electrical Review, Feb. 13. 10 cts.

Transmission Circuits, Practicability of Light and Power from Electric Railway. Paper before Central Electric Railway Association. By G. H. Kelsey. Illustrated. 2½ pp., Electric Railway Journal, Feb. 6. 10 cts.

Street Lighting from Interurban Railway Circuits. By G. N. Chamberlin. 4½ pp., General Electric Review, February.

Controllers, Street Light. Year's experience with automatic system in Liverpool. 1/3 p., Municipal Journal and Engineer, Feb. 3. 10 cts.

High Efficiency Lamps, Competition from. Paper before National Commercial Gas Association. By T. J. Little. 2 1-2 pp., American Gas Light Journal, Jan. 25. 10 cts; 1½ pp., Progressive Age, Feb. 1. 20 cts.; 3 pp., Light, January. 20 cts.

Progress of Tungsten Street Lighting in New York. Illustrated. 1½ pp., Illuminating Engineer, January. 20 cts.

Acetylene and Individual Street Lamps. ½ p., Acetylene Journal, February. 5 cts.

Acetylene Town Lighting. By W. J. Stinson. 1 p., Acetylene Journal, February. 5 cts.

Municipal Lighting Plant, Holyoke, Mass. ½ p., Municipal Journal and Engineer, Feb. 17. 10 cts.

Fort Wayne's Municipal Light Plant. Detailed description of construction and operation. By Frank H. Williams. Illustrated. 4 pp., Municipal Journal and Engineer, Feb. 24. 10 cts.

Municipal Power and Light Plants. 2½ pp., Western Municipal News, February. 10 cts.

Calorimetry. Report of Committee of American Gas Institute. Illustrated. 17 pp., Progressive Age, Feb. 15. 20 cts.

Pipe Standards. Report of Committee of American Gas Institute. Illustrated. 4½ pp., American Gas Light Journal, Jan. 25; 5 pp., Feb. 1; 2 pp., Feb. 8. 10 cts.

Municipal Regulation of Gas Supply. 1 p., Engineering Record, Feb. 13. 10 cts.

Supreme Court and New York Gas Rate. 3½ pp., Public Service, February. 20 cts.

Public Service Commission for the First District, Report of the. ½ p., American Gas Light Journal, Jan. 25. 10 cts.

Report of Public Service Commission, Second District of New York. 2/3 p., American Gas Light Journal, February 8.

Gas Companies. Capitalization, Assets and Profits of Massachusetts. By W. D. Marks. 3½ pp., Progressive Age, Feb. 1. 20 cts.

Customer Profit Sharing. By W. H. Gardiner. 1½ pp., Progressive Age, Feb. 1. 20 cts.

Public Utilities, Future Development of. Paper before Northwestern Electrical Association. By B. H. Meyer. 2 pp., Electrical Review, Jan. 30. 10 cts.

Hydraulic Power Development of New York, Control of. 3 pp., Engineering Record, Feb. 13. 10 cts.

Actual Cost of Power. ½ p., Power, January 26.

FIRE AND POLICE

Fire Department, The Binghamton. 2 pp., Fireman's Herald, Feb. 6. 5 cts.

First Paid Fire Department in the U. S. 2 pp., Fireman's Herald, Jan. 30. 5 cts.

Civil Service Demoralizes Fire Departments. 2 pp., Fireman's Herald, Feb. 13. 5 cts.

Co-operation in Fighting Fires. Tabular statement of practice and policy in 120 cities. 2 pp., Municipal Journal and Engineer, Feb. 17. 10 cts.

Fire Engine House, San Francisco, Cal. Illustrated. 1 p., Municipal Record, Feb. 4. 10 cts.

Concrete Fire Station, Weston, Mass. Detailed description and plans. Illustrated. 3 pp., Municipal Journal and Engineer, Feb. 17. 10 cts.

Concrete Fire Station, Weston, Mass. Illustrated. 3 pp., Cement Age, February. 15 cts.

High-Pressure Fire Service, Manhattan. Illustrated. 9 pp., Industrial Progress, February. 25 cts.

Crucial Practical Test of the High-pressure Fire Service. ½ p., Engineering News, Feb. 11. 15 cts.

Patrol Wagons, Cost of Maintaining. ¼ p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Hydrants, Frozen Fire. ½ p., Municipal Journal and Engineer, Feb. 17. 10 cts.

Fire Alarm Equipment, Albany, N. Y. Technical description of new system. Illustrated. 3 pp., Municipal Journal and Engineer, Feb. 3. 10 cts.

Fire Protection. By E. G. Wiswell. 2 pp., Western Municipal Journal, February. 10 cts.; 2 pp., Canadian Municipal Journal, February. 10 cts.

Combustion and Its Prevention. By Edw. Ransford. ½ p., Fire and Water, Jan. 27. 10 cts.

Fire Rates, The Making of. 2 pp., The Financier, Feb. 1. 25 cts.

GOVERNMENT AND FINANCE

Home Rule for Cities. Series of addresses before League of American Municipalities. 17 pp., City Hall, December. 10 cts.

Government of Staunton, Va. Duties of General Manager. 2½ pp., Municipal Economist, January. 50 cts.

The Des Moines Plan. Text of Act of Legislature. 2½ pp., Municipal Economist, January. 50 cts.

Outline of Commission Plan of Government. By C. W. Eliot. 2 pp., Municipal Economist, January. 50 cts.

Recall of Mayor Harper. Statement by the Municipal League of California. 5 pp., Municipal Affairs, February.

Suburban Residents to Vote in San Francisco, Proposition to Allow. 2/3 p., Merchants' Association Review, February. 10 cts.

Public Business, Instruction in. By W. H. Allen. 12 pp., Political Science Quarterly, Vol. XXIII, No. 4.

Municipal Ownership Discussed. Proceedings of League of California Municipalities. 10 pp., Pacific Municipalities, January.

Corporation Regulation. By H. L. Doherty. 1 p., Progressive Age, Feb. 1. 20 cts.

Public Service Commissions, New York. Paper before National Municipal League. By T. N. Osborne. 2 pp., Electric Railway Journal, Feb. 20. 10 cts.; 5½ pp., Midland Municipalities, February. 10 cts.

Recommendations of Governors to the Legislatures Regarding Public Service Corporations. 1½ pp., Electric Railway Journal, Feb. 6. 10 cts.

Wisconsin Railroad Commission. Second Annual Report. 1/3 p., Electric Railway Journal, Feb. 13. 10 cts.

Co-operation between Railroad Commission and the Municipalities. Paper before Wisconsin Municipal League. By B. H. Meyer. 2 pp., Concerning Municipal Ownership. January. 10 cts.

Courts of Inferior Jurisdiction. By E. T. Devine. 3 pp., Charities, Feb. 10. 10 cts.

Aldermen and Their Courts. By H. V. Blackster and A. H. Kerr. 8 pp., Charities, Feb. 6. 25 cts.

Legislation of 1908 in Relation to Municipal Engineering. 1 p., The Surveyor, Jan. 29. 20 cts.

Legal Precedents of 1908 in Relation to Municipal Engineering. By J. B. R. Conder. 4 pp., The Surveyor, Jan. 29. 20 cts.

Civic League of Salem, Mass. ¼ p., Municipal Journal and Engineer, Feb. 24.

Local Taxation and Municipal Accounts. By John Allcock. 1/3 p., Local Government Journal, Jan. 16; 1/3 p., Jan. 23. 10 cts.

Finance, A Year of Municipal. Summary of British Taxation returns, 1905-6. 1 p., Municipal Journal, February. 10 cts.

Extravagance, Municipal. By Geo. Curtis. 1½ pp., Municipal World, February. 10 cts.

Salaries of Ohio Officials. Table compiled from report of Ohio Bureau of Inspection. ¼ p., Municipal Journal and Engineer, Feb. 3. 10 cts.

City Accounting in Massachusetts. ¼ p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Trend Toward Uniform Accounting. ½ p., Engineering Record, Feb. 6. 10 cts.

Depreciation of Plant, Fair Rates for Public Service. 2/3 p., Engineering Record, Feb. 20. 10 cts.

TRAFFIC AND TRANSPORTATION

Transportation Situation in Massachusetts. 3-4 p., Engineering Record, Jan. 30. 10 cts.

Transit Situation in Pittsburg. By J. P. Fox. Illustrated, 18 pp., Charities, Feb. 6. 25 cts.

Arnold Report on New York Subway Traffic. 6 1-2 pp., Electric Railway Journal, Jan. 30. 10 cts.

Financial Problems Confronting the Boston Elevated Railway Company. By C. S. Sergeant. Illustrated, 5 pp., Electric Railway Journal, Feb. 6. 10 cts.

Railroad Taxation. By C. F. Kimball. 6 pp., Midland Municipalities, February. 10 cts.

A Year of Tramways. Board of Trade's review of finances of municipal and private enterprises. Municipal Journal, Feb. 5. 15 cts.

Street Car, Light Prepayment Type of. Standard adopted by the Metropolitan Street Railway Co. of New York. Illustrated, 1-2 p., Engineering News, Feb. 11. 15 cts.

Fender and Wheel Guard Hearings in New York. 2 pp., Electric Railway Journal, Feb. 20. 10 cts.

Street Car Fenders and Wheel Guards. Account of tests made by Public Service Commission of the First District, New York. Illustrated. 5 pp., Municipal Journal and Engineer, Feb. 10. 10 cts.

Fender and Wheel Guard Tests, Public Service Commission of New York. 3 1-2 pp., Electric Railway Journal, Feb. 6. 10 cts.

Concrete in Boston's New Subway. Illustrated, 4 pp., Concrete, February. 15 cts.

Applicability and Comparative Cost of Concrete and Reinforced Concrete for Subway Construction. Paper before National Association of Cement Users. By C. M. Mills. 1 2-3 pp., Engineering-Contracting, Feb. 10. 4 pp., Cement, January. 25 cts.

Grout Mixing Machine of the United Railways of St. Louis. Illustrated, 2-3 p., Electric Railway Journal, Feb. 20. 10 cts.

Municipal Electric Road of Osaka. By Yoshio Katagiri. Illustrated, 2 1-2 pp., Municipal Journal and Engineer, Feb. 3. 10 cts.

Automobiles May Solve Traffic Problem. 1-2 p., Automobile, January 28.

MISCELLANEOUS

Refuse Incinerator for Milwaukee. Account of the amount and character of refuse to be destroyed and requirements of furnaces. 3 1-2 pp., Municipal Journal and Engineer, Feb. 10. 10 cts.

Garbage Crematory of Newport Naval Training Station. By R. E. Bakenhus. Illustrated, 1 1-2 pp., Engineering Record, Feb. 20. 10 cts.

Garbage Incineration in Scranton. Description of municipal system of collection and two incinerators recently built. Illustrated. 4 pp., Municipal Journal and Engineer, Feb. 3. 10 cts.

Smoke Prevention and Fuel Economies. 1-2 p., Contract Journal, Feb. 10. 20 cts.

Government and the Smoke Problem. By J. L. Cochrane. Illustrated, 4 pp., Review of Reviews, February. 25 cts.

Bridge, Protected Steel and Concrete Highway. Illustrated, 1 1-3 pp., Engineering Record, Feb. 20. 10 cts.

Construction Methods on Two Highway Bridges at Nashville, Tenn. Illustrated, 2 pp., Engineering Record, Feb. 13. 10 cts.

Plate Girder Bridge, with Concrete Piers. Method and cost of construction. 3 pp., Engineering-Contracting, Feb. 3. 10 cts.

River Bridges at Nashville. Illustrated, 2 pp., Engineering Record, Feb. 6. 10 cts.

Cost of Reinforced Concrete Bridges with Regard to Maintenance. By E. P. Goodrich. 4 1-2 pp., Good Roads, February. 10 cts.

Foot Walks of the Blackwell's Island Bridge. By F. W. Abbott. Illustrated, 5 pp., Engineering News, Jan. 28. 15 cts.

Cost of Concrete Bridges. From paper before National Association of Cement Users. By H. M. Quimby. 1 p., Good Roads, February. 10 cts.

Ornamental Bascule Bridge; Trunnion Bascule Across Cooper's Creek at Federal Street, Camden, N. J. By J. B. Strauss. Illustrated, 4 pp., Engineering News, Feb. 4. 15 cts.

Reinforced Concrete Highway Bridge. Method and Cost of Construc-

tion. 1-2 p., Engineering-Contracting, Feb. 3. 10 cts.

Corrosion of Iron. From paper before Boston Society of Art. By W. H. Walker. 1 1-2 pp., Engineering Record, Feb. 20. 10 cts.

Concrete, Economies of Graded. By E. M. Perdue. 2-3 p., Engineering-Contracting, Feb. 10. 10 cts.

Reinforced Concrete Pile Bents for the Atlantic City Boardwalk. Illustrated, 3 pp., Engineering-Contracting, Feb. 17. 10 cts.

Strength of Concrete Joints. From paper before Engineers' Society of Western Pennsylvania. By J. L. Miner. 2-3 p., Engineering Record, Feb. 13. 10 cts.

Action of Frost on Cement and Cement Mortar. By E. R. Matthews and James Watson. 13 pp., Proceedings of Am. Soc. of C. E., January. 50 cts.

Bonding of New to Old Concrete. By E. P. Goodrich. 25 pp., Proceedings of Am. Soc. of C. E., January. 50 cts.

Report on Reinforced Concrete by Committee of the American Society of Civil Engineers. 3-4 p., Engineering Record, Jan. 30. 10 cts.

Waterproofing—Its Various Applications and Comparative Costs. By T. H. Boorman. 4 1-2 pp., Concrete, February. 15 cts.

Waterproofing Detroit River Tunnel. By R. G. Wright. 1 1-2 pp., Waterproofing and Fireproofing, January. 15 cts.

Asphaltum, Use of. Paper before Technical Society of the Pacific Coast. By Harry Larkin. 10 pp., Journal of Association of Engineering Societies, December. 30 cts.

Walls, Stability of. Paper before Society of Architects. By Henry Adams. Illustrated, 5 1-2 pp., Surveyor, Jan. 15. 20 cts.

Bank Protection Work at Pine Bluff, Ark., Recent Experience with. Review and communication from Major M. L. Walker. Illustrated, 3-4 p., Engineering News, Jan. 28. 15 cts.

Specifications for Engineering Works. Paper before Society of Civil and Mechanical Engineers. By H. L. Butler. 1 1-3 pp., Contract Journal, January 13; 20 cts. 2 1-2 pp., Surveyor, Jan. 15; 20 cts.

Drawing Specifications for Engineering Work. Paper before Civil and Mechanical Engineering Society. By H. L. Butler. 3 pp., Engineering-Contracting, Feb. 3. 10 cts.

Bids, Receiving Irregular. 1-2 p., Municipal Journal and Engineer, Feb. 10. 10 cts.

Municipal Construction vs. Contract Work. Paper before League of California Municipalities. By F. J. Boland. 8 pp., Pacific Municipalities, January. 10 cts.

Municipal Engineering. Presidential address before Society of Engineers. By E. J. Silcock. 5 pp., the Surveyor, Feb. 5. 20 cts.

Municipal Engineering in 1908. A review. 22 pp., the Surveyor, Jan. 29. 20 cts.

Status and Duties of Municipal Engineer. Paper before Institution of Municipal Engineers. By Frank Latham. 2 pp., Contract Journal, Jan. 27. 20 cts.

Some of the duties of the British Municipal Engineer. Presidential address before students of Institution of Civil Engineers. By F. J. Edge. 1 p., Engineering News, Feb. 4. 15 cts.

Public Works of the Philippine Islands. Illustrated, 7 pp., Far Eastern Review, December. 25 cts.

Inspectors, Civil Engineers as. 1-3 p., Municipal Journal and Engineer, Feb. 17. 10 cts.

Reclamation of the Site of the Beach City of Naples, Cal. 2 pp., Engineering Record, Feb. 6. 10 cts.

Use of Wagons in Transporting Earth. 2 pp., Engineering-Contracting, Feb. 3; 2 pp., Feb. 10; 2 pp., Feb. 17. 10 cts.

Costs of Construction, Preparation of Expert Testimony On. 1 p., Engineering-Contracting, Feb. 10. 10 cts.

Working Drawings, Important Possibility In. 1 1-3 pp., Engineering News, Jan. 28. 15 cts.

Municipal Acquisition of Land. 1-3 p., Municipal Journal and Engineer, Feb. 10. 10 cts.

Assessing Corner Lots. Decision of Supreme Court of Illinois. 1-2 p., Municipal Journal and Engineer, Feb. 10. 10 cts.

House Numbering in Chicago. Ordinance and account of its operation. Illustrated, 1 1-2 pp., Municipal Journal and Engineer, Feb. 3. 10 cts.

House Numbering in Louisville. Account of progress under ordinance of 1907. 1-3 p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Records of Municipal Construction. 1-4 p., Municipal Journal and Engineer, Feb. 3. 10 cts.

Newark's Bureau of Statistical Information. By J. J. Connelly. Illustrated, 3 pp., Municipal Economist, January. 50 cts.

Some of the Recording Systems of a Large Engineering Corporation. Account of methods of Stone and Webster Engineering Corporation described in the "Armour Engineer," by R. M. Henderson. 1 1-2 pp, Engineering Record, Jan. 30. 10 cts.

City Advertising. 1-4 p., Municipal Journal and Engineer, Feb. 24. 10 cts.

Franchises. How New York City Submits Applications for Public Service Franchises to an Engineering Department. 1 p., Engineering News, Feb. 11. 15 cts.

Investigation by the Division of Franchises of the Application of the New York Cahill Telharmonic Company for a Franchise to Lay Wires in the Streets of New York for the Purpose of Distributing Music Electrically. 2 1-2 pp., Engineering News, Feb. 11. 15 cts.

Playgrounds in the 100 Largest Cities of the United States, Statistics of. By L. P. Ayres. 3 1-2 pp., The Playground, February. 10 cts.

Civic Improvement Possibilities of Pittsburg. By C. M. Robinson. Illustrated, 26 pp., Charities, Feb. 6. 25 cts.

Civic Improvement Movement in Ontario. By H. L. Hutt. 2 pp., Canadian Municipal Journal, February. 10 cts.

Art and the City. Account of New York Conditions. Illustrated, 2 pp., Municipal Journal, February. 10 cts.

Municipal Review, 1907-1908. By C. R. Woodruff. 32 pp., American Journal of Sociology. January. 50 cts.

Housing Progress. Monthly record of the National Housing Reform Council. 1 p., Municipal Journal, Feb. 5. 15 cts.

Garden Cities as a Solution of the Housing Problem. By E. G. Culpin. 6 pp., Journal of Preventive Medicine, February. 60 cts.

Pittsburg's Housing Laws. By E. W. Dinwiddie. Illustrated, 8 pp., Charities, Feb. 6. 25 cts.

Housing Situation in Pittsburg. By F. E. Crowell. Illustrated, 11 pp., Charities, Feb. 6. 25 cts.

BOOK REVIEWS

Highway Engineering. By Chas. E. Morrison. New York: John Wiley & Sons, 1908. Cloth, 6 by 9½ inches, 315 pp. Price, $2.50.

This text-book was prepared by the author, who is an instructor in civil engineering, Columbia University, for the use of second-year students. The author states that it has been his endeavor to outline and emphasize basic principles. He treats his subject in ten chapters. Under the caption of "Road Resistances" the underlying principles and the methods of determining the resistance of different roads is explained. Under "Earth Roads" the contour, drainage system and method of construction and maintenance are treated. Gravel and broken stone roads are each given a chapter, the latter including methods of testing stones for their value as road building materials. Oiled roads are included in the chapter on miscellaneous roads, and are hardly given the space which their growing importance demands. The chapter on street design includes systems of planning city streets, as well as their grades. The rules of Hering and Rosewater are given for laying out intersections, but the author notes that more judgment and ingenuity are often required in laying than the rules give. A very simple rule that works well in practice is simply to raise the center of the intersection above that of the grade of the crowns of the streets, where those grades are moderate. A chapter is given each to stone, brick, asphalt and wooden pavements. The method of treatment of each of these subjects is similar. Standard methods are adhered to and each important item usually treated in specifications is explained in a clear and concise manner.

Modern Baths and Bath Houses.—By Wm. Paul Gerhard, C. E. New York: John Wiley & Sons, 1908. Cloth, 6x9½ inches, 311 pp., 130 figures. Price, $3.

The author, an engineer and architect, has studied the design and equipment of public baths both in this country and abroad. He has designed some of the best public baths in this country. The book is designed both for popular reading in spreading the doctrine of physical and moral improvement by means of bathing, as well as for the use of architects in designing baths. For the latter, plans, photographs and an extensive bibliography are added. The book is attractive in appearance and finely illustrated. The sanitary advantage of bathing and the moral benefits resulting are discussed. Different forms of baths are described and the great superiority of the modern rain bath pointed out. A large amount of space is given to public bath houses and people's baths, that being the most important practical subject included in the book. Other practical topics of general interest treated in detail are factory baths, school baths, baths for military barracks, prisons and jails, hospital baths, baths for clubhouses, gymnasiums, hotels and barber shops, river and sea baths.

Plumbing. By W. B. Gray and C. S. Ball. Chicago, Ill.: American School of Correspondence. Cloth, 6½x9½, 228 pp. Price, $1.50.

This manual is written as a practical working guide. The authors divide this subject into the following topics: Plumbing fixtures, house water supply, gas piping and fixtures, house sanitation, coil testing and ordinances.

NEWS OF THE SOCIETIES

Municipal Engineers of the City of New York.—At the meeting on February 24, Carl H. Nordell read a paper entitled "An Additive Method of Run-off Determination for Storm Water Sewers," which was illustrated by diagrams and lantern slides. In this paper Mr. Nordell based a method of designing storm sewers upon the rational method advocated by Mr. Kuichling several years ago; the chief aim of the paper being to describe certain methods of application and of calculation, including the use of a rain fall curve of a typical heavy storm for determining maximum rain fall, and a slide rule for facilitating the various calculations involved. The paper was discussed by Albert O. Schreiner, Assistant Engineer in the Sewer Bureau of Queens Borough; C. E. Gregory, Assistant Engineer of Water Supply of Manhattan; Victor H. Reichelt, Assistant Engineer Construction Bureau, Richmond; A. Prescott Folwell, and A. S. Tuttle, Engineer of the Board of Estimate and Apportionment. The Society voted to request the Board of Directors to consider methods for making arrangements for collecting run-off data, including the establishing of rain gauges, sewer gauges, etc., in several typical areas of Greater New York. The following were elected members: Kenneth Allen, Engineer of Metropolitan Sewerage Commission, Manhattan; Arthur Edward Piguet, Topographical Draughtsman, Borough President, the Bronx; William S. Rockwell, Transitman, Borough President, Richmond; Berthold Scheiman, Topographical Draughtsman, Board of Estimate, Manhattan.

At the next regular meeting, March 24, Engineering Societies Building, 29 West Thirty-ninth street, a paper will be presented on "Some Interesting American Trees," by Herman W. Merkel, Chief Forester, New York Zoological Park.

New York Electrical Society.—At the meeting held in the Engineering Societies' Building, 29 West Thirty-ninth street, New York, N. Y., February 17, Dr. Louis Bell, M.Am. Inst. E. E., delivered a lecture on "Modern Practice in Street Lighting." A number of lantern slides were shown illustrating prevalent European street lighting practice.

American Society of Inspectors of Plumbing and Sanitary Engineers.—The fourth annual meeting was held at Omaha, Neb., February 8-10. Among the papers presented were the following: "The Cesspool and Its Dangers," Burton J. Ashley, Chicago; "Sewage Disposal in Fresno, Cal.," Robert H. Ellithorpe, Fresno; "Siphons for Sewage Disposal Tanks," Alfred R. McGonegal, Washington, D. C.; "Sanitation on the Panama Canal Work," Charles L. Stockelberg, Inspector of Plumbing, Culebra, Canal Zone; "A Standard for Plumbing Material," E. Willard, Kokomo, Ind.; "Water Waste," Henry B. Davis, Washington, D. C.

Ohio Electric Light Association.—The fifteenth annual convention will be held in Toledo, July 13-15. Annual conventions have formerly been held in August. The program will include the following topics: "The Titanium Arc Lamp"; "Reports and Discussion on Tungsten Lamp Experience"; "The Supply of Current, for Lighting, to Other Towns from a Centrally Located Station"; "Report on Methods of Lamp Renewals"; "Commercial Organization of an Electric Light Company, and Its Relation to the Public"; "Factors Determining the Price to be Charged for Street Lighting."

Washington Society of Engineers.—At the meeting February 16, at the Chamber of Commerce, Washington, D. C., Van H. Manning, Topographer of the United States Geological Survey, gave an illustrated lecture, "Overflow Lands of the Yazoo Delta," outlining the reclamation work along the Mississippi River extending south from a point ten miles south of Memphis and involving an area of 7,000 square miles, and showing slides depicting the damage done by the overflowing of the waters of the Mississippi River. An informal reception was given at this meeting to the seven engineers who accompanied President-elect Taft to the Panama Canal Zone, and they spoke of general conditions on the canal zone. Comparisons between the work done by the French and that done by the American government were made, decidedly in favor of the latter. Isham Randolph, of the Illinois Improvement Company of Chicago, who paid a high tribute to the ability of Colonel Goethals, said that what the French did was remarkable, considering the equipment they had. "When the French commenced to dig the Culebra cut," he said, "the level was 233 feet above the sea. When they stopped it was 168 feet above, and now it is ninety feet above sea level. It is the greatest movement of dirt in history." Others of the board of consulting engineers who discussed the climate, the sanitary and other conditions on the isthmus were Frederic P. Stearns, of Boston, Chairman of the Board; John R. Freeman, of Providence, R. I.; Captain Charles P. Allen, of Chicago; Allen Hazen, of New York; James D. Schuyler, of Los Angeles, and Arthur P. Davis, Chief Engineer of the Reclamation Service. F. H. Newell, Director of the Reclamation Service, on behalf of the Society, thanked the Board of Engineers for the information they had given the Society. At the end of the reception a buffet luncheon was served.

International Association of Police Chiefs. — Superintendent of Police Michael Regan, of Buffalo, N. Y., has been notified that the annual convention of the Police Chiefs would be held in Buffalo during the week beginning May 31. There was a great battle on among half a dozen cities for this meeting, but Buffalo was victorious. Chief Regan has started to make arrangements for the big meeting. There will be about three hundred chiefs in attendance, and, with their wives and friends, it is estimated that about 1,000 persons will be on hand. The executive board of the association at the last convention, at Grand Rapids, Mich., decided on Buffalo by a popular vote. Atlanta had a vote of 27; Birmingham, Ala., polled a vote of 28, and Seattle, Wash., came along with 23. Buffalo beat them all with a vote of 83 in favor of having the convention in that city.

Association of Chiefs of Police of Texas.—A meeting of several members of the Texas Chief of Police Association was held in Austin at the City Police Station. Those present resolved themselves into a committee and took up for consideration business which will come up before the next State Convention of the Chiefs of the Texas city police and in the interest of legislation pertaining to police officers. The following attended the meeting: James H. Maddox, Chief of Police of Fort Worth; B. F. Brandenburg, Chief of Police of Dallas; George A. Smith, Manager, Bureau of Criminal Identification, Dallas; Hollis Barron, Chief of Police of Waco; W. L. Sallis, Chief of Police of Brenham; Ben F. Jenkins, Chief of Police of El Paso.

New England Water Works Association.—The March meeting of the association will be held at Hotel Brunswick, Copley Square, Boston, Mass., March 10, at 10 o'clock. The headquarters in Tremont Temple will be open and a meeting of the Executive Committee held there at 11:30 o'clock. At 1 o'clock lunch will be served at Hotel Brunswick, and Hon. Joseph C. Pelletier, of the Massachusetts State Civil Service Commission, will address the Association on the subject of "Civil Service in Its Application to the Water Department." At a meeting at 2:30 o'clock, the following papers will be presented: "The Ludlow Filters," by Carroll F. Story, Civil Engineer, Springfield; "Ground Waters as Sources of Public Water Supplies," illustrated, by William S. Johnson, Sanitary and Hydraulic Engineer, Boston. A topical discussion will follow. Robert J. Thomas, Lowell, Mass., is President of the Association, and Willard Kent, Narragansett Pier, R. I., Secretary.

Wisconsin Society of Engineers.—The association was organized at a meeting at the Engineering Building of the University of Wisconsin on February 24-26. Some 40 engineers from various parts of the State, representing cities, public utilities, colleges and manufacturing plants, met.

Bucks County Good Roads Association.—At the annual meeting, Doylestown, Pa., Wilmer H. Johnson, a representative of the State Highway Department, said that while Bucks County was not in the forefront of the counties petitioning for good roads, it had 67 petitions on file, representing an aggregate of 157 miles. These, with two exceptions, were petitions from the middle and lower townships. He dwelt at some length on the benefit of brick roads where the travel is heavy, and which, while costing more to build, would last at least 20 years without material repair. The association re-elected the following officers: President, Dr. H. W. Johnson, of Riegelsville; vice-presidents, Jonas Frankenfield, of Haycock, and M. P. Hallowell, of Warminster; secretary, J. Hibbs Buckman, of Middletown; treasurer, E. F. Trauger, of Noockamixon.

Calendar of Meetings

March 2-4.
Northwestern Cement Products Association.—Annual convention, Minneapolis, Minn.—J. C. Van Doorn, Secretary, Security Bank Building, Minneapolis, Minn.

March 17.
American Society of Civil Engineers.—Regular meeting at Society House, 220 West Fifty-seventh street, New York.—Charles Warren Hunt, Secretary.

March 24.
Municipal Engineers of the City of New York.—Regular meeting, Engineering Societies Building.—C. D. Pollock, Secretary, 29 West 39th street, New York, N. Y.

May 16-19.
City Marshals and Chiefs of Police of Texas.—Annual convention, Galveston.—Chief J. H. Maddox, Fort Worth, Chairman, Executive Committee.

May 31-June 5.
International Association of Police Chiefs. — Annual convention, Buffalo, N. Y.—Maj. Richard Sylvester, President, Washington, D. C.

June 1-4.
National Electric Light Association.—Thirty-second convention, Atlantic City, N. J.—W. W. Freeman, Engineering Societies Building, 29 West 39th street, New York, N. Y., Secretary.

July 6-9.
American Society of Civil Engineers.—Annual convention, Mount Washington Hotel, Bretton Woods, N. H.—Charles Warren Hunt, Secretary, 220 West 57th street, New York, N. Y.

July 13-15.
Ohio Electric Light Association.—Annual convention, Toledo, O.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Street Railways—Sanitation Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREET IMPROVEMENTS	
Ohio	Sandusky	Mar. 4, noon	Furn. crushed stone to macadamize sts.; also material and bldg. stone and cement sidewalks during 1909	A. J. Stoll, Pres. Bd. Pub. Service.
Ohio	Delaware	Mar. 4, noon	Bldg. cement walks, various sts.; check, $2,000; grade, curb, etc.	R. M. Swickheimer, Clk. Bd. Pub. Serv.
Minnesota	St Paul	Mar. 4, 2 p.m.	Paving, any material, alley Block 3, Summit Park Addition	John S. Grode, Pres. Bd. Pub. Wks.
New York	Corning	Mar. 4, 7:30 p.m.	Brick paving, 3,000 sq. yds.; macadam, 4,300 yds.; cement curb	R. H. Canfield, Supt. Pub. Wks.
Indiana	Wabash	Mar. 4, 10 a.m.	Constructing County line gravel road, inc. graveling, etc	J. P. Noftzger, County Auditor.
Indiana	New Castle	Mar. 5, 10 a.m.	Constructing gravel road in Fall Creek township	William L. Risk, County Auditor.
Ohio	Youngstown	Mar. 5, noon	Improving Ridge and Andrews aves.	W. H. McMillin, Clk. Bd. Pub. Serv.
Texas	Dallas	Mar. 5	Paving No. Ervay St., all kinds of materials	J. M. Preston, City Engineer.
Indiana	Marion	Mar. 6, 2 p.m.	Bldg. stone road on Co. line; also brick and stone, 3,119 ft. long.	A. Y. Yout, County Auditor.
Indiana	Williamsport	Mar 6, 1 p.m.	Bldg. gravel road in Adams and one in Warren twp	Geo. W. Edwards, County Auditor.
Ohio	Cleveland	Mar. 6, 11 a.m.	Grading, draining and improving Wooster road, Rock River vil.	A. B. Lea, County Surveyor.
New York	Buffalo	Mar 8, 12:30 p.m.	Brick or asphalt paving on concrete or macadam or dressed block stone, all connections, etc , Richmond Ave	George H. Selkirk, Sec'y P'k Com'rs.
Iowa	Webster City	Mar. 8	Brick block paving, about 25,000 sq. yds	P. M. Banks, City Clerk.
Dist. of Col'bia	Washington	Mar. 9 10 a.m.	Furnishing 12,700 asphalt paving blocks; Schedule 969	Bur. Supp. and Accts., Navy Dept.
Indiana	Muncie	Mar. 9	Paving 9 blocks; John O. Potter, Eng'r Bd. Pub. Wks	J. A. Jackson, City Clerk.
Missouri	St. Louis	Mar. 9, noon	Improving various streets and alleys	A. J. O'Reilly, Pres. Bd. Pub. Impts.
Ohio	Columbus	Mar. 9, noon	Macadamizing, Gahanna Cem. Imp., Mifflin Twp.	F. M. Sayre, County Auditor.
Kansas	Topeka	Mar. 10, 5 p.m.	Brick paving, 53,738 yds; grading, 37,945 yds; cement curb & gutter, 32,119 ft	C. B. Burge, City Clerk.
Ohio	Cleveland	Mar. 10, 11 a.m.	Grading, draining and improving Settlement road	Wm. F. Black, Clk. Co. Comrs.
Indiana	Anderson	Mar. 10, 10 a.m.	Bldg. 16 gravel roads, various twps.; total length, 133,059 ft.	Wm. T. Richards, County Auditor.
Manitoba	Winnipeg	Mar. 10, 11 a.m.	Furnishing 2,500 to 3,500 tons asphalt for st. paving	M. Peterson, Sec'y Bd. Control.
New York	Brooklyn	Mar. 10, 11 a.m.	Regulating and repaving asphalt on concrete, various sts.; furn. 100,000 sq. ft. bluestone flagging, 6,000 cu. yds. paving sand, 10-ton steam macadam road roller, trap rock, etc	Bird S. Coler, Boro. President.
Ohio	Toledo	Mar. 11, 10 a.m	Repairing Lagrange St. stone road No. 5, Washington twp.	D. T. Davies, Jr., County Auditor.
New York	New York	Mar. 11, 3 p.m.	Repairing seven steam rollers	Henry Smith, Pres. Park Board.
Wisconsin	Beaver Dam	Mar. 12, 7:30 p.m.	Brick paving 15,000 sq. yds., grading, curbing, etc., 3 streets	Anton A. Fischer, City Clerk.
Virginia	Nat'l Sol. Home.	Mar. 12	Labor and material for 3,465 sq. yds. concrete sidewalks	John T. Hume, Treas. Sold. Home.
Kansas	Ft. Scott	Mar 13	Combined curb and gutter, 5,520 ft.; macadam paving, 1,150 sq. yds.; also 4 blocks brick paving, 48 ft wide, cost, $13,000.	R. L. Stroude, City Engineer.
Ohio	Cleveland	Mar. 13, 11 a.m.	Grading, draining and improving Lake Shore boulevard	A. B. Lea, County Surveyor.
Oklahoma	Muskogee	Mar. 15, noon	Brick paving on 5-in. concrete, curb, gutter, etc., alley	Morgan Caraway, City Clerk.
Iowa	Iowa City	Mar. 15	Doing all or any portion of township road work	Harry Weider, Clk. Graham Twp.
Oklahoma	Paulo Valley	Mar. 15	Brick paving, 17,986 sq. yds., furn. material, etc	L. C. Hunter, City Engineer.
Ohio	Ashland	Mar. 15, noon	Grading, curbing and paving Bank and Grant streets	J. Cahn, Mayor.
Washington	Hoquiam	Mar. 16, 6 p.m.	Clearing, filling, laying sewers, brick pavement, curb, cement, sidewalks, etc., I and Eighth Sts.; cost, $138,642	Z. T. Wilson, City Clerk.
New Jersey	Bayonne	Mar. 16, 8 p.m.	Furn. asphalt and paving 19,150 sq. yds., 4 streets	F. W. Dalrymple, City Engineer.
New Jersey	Cape May	Mar. 16, noon	Bldg. gravel road 2,902 miles long, Holly Beach Turnpike	R. Fendall Smith, County Eng'r.
Ohio	Bryan	Mar. 16, noon	Grading and macadamizing 1 ¼ miles road; cost, $6,999	Jas. C. Wonders, St. Hwy. Com'r, Col.
New York	Kingston	Mar. 19, 7:30 p.m.	Paving vit. brick, first quality block size 53,500 sq. yds., 4 sts.; regulating, resetting curb, etc	Dayton Murray, City Clerk.
Wisconsin	Racine	Mar. 20, 10 a.m.	Paving Main and Marquette streets	H. P. Connolly, Chm. Bd. Pub. Wks.
Ohio	Cleveland	Mar. 20, 11 a.m.	Grading, draining and improving Northfield road	A. B. Lea, County Surveyor.
Texas	Paris	Mar. 22	Paving work to cost $15,000 to $25,000	O. B. McKnight, City Secretary.
Ohio	Jefferson	Mar. 22, 1 p.m.	Grading and macadamizing 3.8 miles of road, New Lyme twp.	J. S. Matson, County Surveyor.
Ohio	St. Bernard	Mar. 26, noon	Grading, macadamizing, concrete curb and gutter, etc., 2 sts.	J. A. Stewart, C.E., Trac'n Bldg., Cin.
Ohio	Cincinnati	Mar. 26, noon	Improving Vargh road from city line to Andrew Ave	Stanley Struble, Pres. Co. Comrs.
Ohio	East Liverpool	Mar. 30, noon	Brick paving, 10,491 sq yds.; 6,734 ft. 24-in. and 6,834 ft. 18-in. concrete curb, 4 catch basins, Lisbon road	Matthew Anderson, Chm. Twp. Trus.
Louisiana	New Orleans	Apr. 1	Improvements on New Basin Canal and Shell road, including rebuilding levee; cost, $105,000	Walter C. Murphy, Levee Board.
New York	Little Falls	Apr. 2, 10 a.m.	Paving, any hard material, 6,400 sq. yds., 2 streets	Dennis B. Reardon, Clk Bd. Pub. W.
Louisiana	Harrisonburg	Apr 5, noon	Building 4 ½ miles of road near Trinity	J. A. Guss, Jonesville.
			WATER SUPPLY	
Montana	Ft. Assiniboine	Mar. 4, 11 a.m.	Bldg. 150 000-gal. steel water tank and trestle	J. E. Sawyer, U. S. A., St. Paul, Minn.
Illinois	Bloomington	Mar. 4, 2 p.m.	Constructing 6-in. c. i. water main in Clay St	C. F. Fauntz, City Engineer.
Wisconsin	Waukesha	Mar. 4, 2:30 p.m.	Furn. 18,000 ft. c. i. pipe, castings, valves, hydrants, etc	E. Merten, Pres. Bd. Water Com'rs.
Utah	Salt Lake City	Mar. 4	Furn. brass fittings and piping for Water Works Dept	L. C. Kelsey, City Engineer.
Ohio	Youngstown	Mar. 5	Furn. 500 tons c. i. pipe, 15 tons specials, 104 gate valves 10 tons soft pig lead, 60 hydrants, 1,200 ext. curb boxes	W. H. McMillin, Clk. Bd. Pub. Serv.
Wisconsin	East Milwaukee	Mar. 6, 8 p.m.	Laying 3,514 ft. 6-in. water main	Oscar A. Reuther, Village Clerk.
New York	White Plains	Mar. 8, noon	Furn. and install. mechanical pressure filtration plant	John N. Heney, Supt. of Water.
Oklahoma	Shattuck	Mar. 8	All material, inc. equipment for constructing water works	O'Neil Engineering Co., Dallas, Tex.
New York	New York	Mar. 8, 2 p.m.	Furn., laying, etc., water mains in various streets	John H. O'Brien, Com. W. S., G. & E.
New York	New York	Mar. 9, 11 a.m.	Bldg. portion Catskill Aqueduct, inc. 1 mile of tunnel on hydraulic gradient, 17x13 1-3 ft., lined with concrete and 2 short stretches of plain concrete conduit, known as cut-and-cover aqueduct, ½m. long, 17x17 ½ ft. in Phillipstown	J. Waldo Smith, Ch. Eng. Bd. Wtr. Sup.
Mexico	City of Mexico	Mar. 10	Furn. 12,000 tons, 4 to 30-in. c. i. pipe; some 36 to 48-in.	The Mayor.
Illinois	Chicago	Mar. 10, 11 a.m.	Bldg. water service pipes in 20 streets	H. S. Dietrich, Pres. Bd. Local Imp.
Ohio	Toledo	Mar. 11, noon	Bldg. c. i. pipe conduit, concrete culvert and gate chamber	Reynold Voit, Sec'y Bd. Pub. Serv.
Pennsylvania	Lebanon	Mar 11, 5 p.m.	Enlarging dam No. 2 of gravity water supply system, inc. 33,000 cu. yds. earth in dam breast, concrete intake tower 50 ft. high.	T. R. Crowell, City Engineer.
Massachusetts	Boston	Mar. 11, 10 a.m.	Bldg. meter chambers and install. meters, Ft. Warren and Gallipolis Island	Capt. R. H. Rolfe, 263 Summer St.
New York	New York	Mar. 11, 11 a.m.	Bldg. portion of Catskill Aqueduct, inc. 5,450 ft. plain concrete, cut-and-cover, 17x17 ½ ft., and 2 tunnels, 17x13 1-3 ft. on hydraulic gradient, combined length 6,450 ft., in Yorktown	Board of Water Supply.
Missouri	Kansas City	Mar. 11, 2 p.m.	Pumping engine, 15,000,000-gal. at Turkey Creek pumping station; also 25,000,000-gal. engine at Quindaro	Bd. Fire and Water Com'rs.
Pennsylvania	Philadelphia	Mar. 15, noon	Bldg. new filtration plant at Queen Lane Pumping Station for supplementary supply, inc. 26 final filters and 54 preliminary filters, capacity 66,000,000 gals. per day; cost, $2,500,000	Dept. of Public Works.
Oklahoma	Muskogee	Mar. 15, 5 p.m.	Constructing 3,000,000-gal. water filter	L. B. Kinsey, City Engineer.
Kansas	Wichita	Mar. 15, 7:30 p.m.	Constructing system of water works; est. cost, $860,000; cert. check, $10,000; plans, $25; Hiram Phillips, St. L, Mo., Engr.	R. N. Dorr, City Clerk.
Alabama	Montgomery	Mar. 15	Two 200-h.p. water-tube return tubular or Scotch marine boilers, work. pres. 160 lbs., also two 250-h.p. boilers, reinforcing foundation, removing boilers, bricking in, etc	Robert Tait, City Treasurer.
Maryland	Berlin	Mar. 16, 11 a.m.	Bldg. water works and electric light system, inc. water dis. system, 500-gal. duplex pump, piping, etc. 12x125 ft. stand pipe, 3 and 8-in. wells, not over 100 ft. deep, etc	Dodge & Day, Engrs., Washington Bldg., Philadelphia, Pa.
New York	New York	Mar. 18, 11 a.m.	Bldg. Walkill Siphon, deep-pressure tunnel in rock, 14 ½ ft. diam., 23,400 ft. long, crossing under Walkill river, 6 shafts, 350 to 480 ft. deep, adjacent grade tunnels and concrete cut-and-cover aqueduct	Board of Water Supply.
Massachusetts	Boston	Mar. 19, 10 a.m.	Extensions to water and sewer systems at Fort Andrews	Capt. R. H. Rolfe, 263 Summer St.

BIDS ASKED FOR

State	City	Received Until	Nature of Work	Address Inquiries to
			WATER SUPPLY—Continued	
New York	New York	Mar. 22, 11 a.m.	Bldg. Turkey Mountain grade tunnel, 1,400 ft. long, 17x13 1-3 ft. on hydraulic gradient; also Croton Lake pressure tunnel, crossing under Croton lake, 14 ft. diam., 2,600 ft. long, two shafts, 510 and 560 ft. deep; bloff-off tunnel, 400 ft. long; 3 sections, 2,000 ft. cut-and-cover, 17x17½ ft., in Yorktown	John A. Bensel, Pres. Bd. Wtr. Sup.
Montana	Stevensville	Mar. 25, 5 p.m.	Bldg. w. w. system, inc. 10,600 ft. 6-in., 10,650 ft. 4-in., 11,700 ft. 8-in. wire-wound wooden pipe, 23 hydrants, small reservoir, etc.; check, $1,000; J. H. Kyd, C.E., Butte	George T. Baggs, Town Clerk.
Oklahoma	Muskogee	Mar. 29, 5 p.m.	Furn. 4,000,000-gal. high and 5,000,000-gal. low service pump and 250 h.p. tubular boiler; L. B. Kinsey, Engineer	Morgan Caraway, City Clerk.
California	Petaluma	May 5, 7 p.m.	Furn. and install. pump. mach. for salt-water high-pressure sys.	City Clerk.
			SEWERAGE	
Ohio	Sandusky	Mar. 4, noon.	Furn. material and bldg. Cable Park sewerage system	A. J. Stoll, Pres. Bd. Pub. Serv.
Iowa	Muscatine	Mar. 4, 7:30 p.m.	Bldg. 503 ft. main trunk sewer, 7 2-3 x 8 ft.; bond, $2,000	James J. Ryan, City Engineer.
New Jersey	Avalon	Mar. 5, 8 p.m.	Bldg. 7,400 ft. t. c. pipe up to 12-in., 10 manholes, 6 flush boxes	R. L. Goff, C.E., Ocean City.
Kentucky	Louisville	Mar. 5, noon.	Bldg. Sec. B, Castlewood sewer; Cont. No. 26, inc. 2,770 ft. 36 to 42-in. concrete sewer, 9 to 18 ft. deep; 675 cu. yds. concrete	H. P. Eddy, Boston, Mass., C. E.
Iowa	Grundy Center	Mar. 8, 8 p.m.	Bldg. 22,650 ft. 6 to 15-in. san. sewer; cost, $15,000 to $18,000	E. A. Crary, Chm. Sewer Com.
Ohio	Akron	Mar. 9.	Bldg. sewer in portion of Washington and Long Sts.	Ray F. Hamlin, Sec'y Bd. Pub. Serv.
Ohio	Toledo	Mar. 9.	Furn. material and bldg. sewer No. 1073 in several alleys	Reynold Voit, Sec'y Bd. Pub. Serv.
Ohio	Oxford	Mar. 9, noon.	Bldg. complete sewage disposal plant, inc. tanks, etc.	D. B. Beaton, Village Clerk.
Ohio	Dayton	Mar. 12, noon.	Bldg. sanitary sewers, Dist. No. 4, inc. 22,265 ft. 8-in., 5,555 ft. 10-in., 1,100 ft. 12-in. vit. pipe; 625 ft. 0 to 6 ft. trench; 22,940, 6 to 8 ft. deep; 4,455 ft. 8 to 10 ft.; 775 ft. 10 to 12 ft.; 125 ft. 12 to 14 ft.; 75 manholes, 40 lamp holes, 27 flush tanks, lead pipe connections, repaving brick, etc	J. C. Ely, Pres. Bd. Pub. Service.
Kentucky	Louisville	Mar. 12, noon.	Bldg. Cave Hill lateral sewers, Cont. No. 27, inc. 4,500 ft. separate sewers, 8 to 30-in., 9 ft. deep, 100 cu. yds. concrete	J. B. F. Breed, Ch. Eng. Sew. Com.
Indiana	Clermont	Mar. 13.	Bldg. pipe sewers, concrete tanks, walls, etc., for complete purification plant for Indiana Girls' School	R. L. Sackett, Purdue Univ., Lafay.
Kansas	Ft. Riley	Mar. 13, 10 a.m.	Constructing 2,300 ft. of sewer and 6 manholes	Capt. W. M Whitman, U. S. Army.
South Dakota	Aberdeen	Mar. 15, 8 p.m.	Bldg. 4,332 ft. 10-in. and 2,906 ft. 12-in. pipe sewer, etc.	F. W. Raymond, City Clerk.
Indiana	Normal City	Mar. 16.	Constructing Jackson St. sewer No. 1	Jas. G. Mendenhall, Town Clerk.
Washington	Hoquiam	Mar. 16, 6 p.m.	Improving I and Eighth sts., by bldg. storm and san. sewers, grading, paving, sidewalks, etc.; cost, $138,642	Z. T. Wilson, City Clerk.
New York	Amsterdam	Mar. 17, 8 p.m.	Constructing, complete, sewers in sundry streets	A. T. Young, Sec'y Sewer Com'rs.
Kentucky	Louisville	Mar. 19, noon.	Bldg. Sec. A, Middle Fork trunk sewer, Cont. No. 28, inc. 3,500 ft. 34 and 79-in. concrete sewer, 1,600 ft. in tunnel, partly in rock, and inc. 860 cu. yds. concrete; H. P. Eddy, C.E., Boston.	W. C. Nones, Chm. Sewer Com.
Massachusetts	Boston	Mar. 19, 10 a.m.	Bldg. sewer system, Ft. Banks; extend system, Ft. Andrews	Capt. R. H. Rolfe, 263 Summer St.
Virginia	Roanoke	Mar. 20, noon.	Bldg. 20-in. d. s., t. c. storm drain in Gainsborough road	W. B. Bates, City Engineer.
Nebraska	Wayne	Mar. 22, 8 p.m.	Constructing sanitary sewer system	Martin Ringer, City Clerk.
Ohio	St. Bernard	Mar. 26, noon.	Material and labor for bldg. sewer in Kemper and Jackson aves.	Geo. Schroeder, Village Clerk.
Indiana	Angola	Mar. 29, 7:30 p.m.	Bldg. main sewer and sewage disposal plant	R. L. Sackett, C.E., Lafayette.
New Jersey	Millville	Apr. 2, 7:30 p.m.	Bldg. sewage disposal plant; $2,000 check	Charles B. Neal, Chm. Sewer Com.
Alabama	Birmingham	Apr. 7.	Bldg. brick and concrete sewers, 7 sections, to cost about $200,000; old bids, given in Feb. 24 issue, rejected	Maury Nicholson, City Engineer.
			BRIDGES	
Arkansas	Paris	Mar. 4.	Constructing 6 bridges for County	Fred N. Cater, County Clerk.
Ohio	Cleveland	Mar. 6, 11 a.m.	Bldg. sub and steel super., Mastick road, over Rocky river	A. B. Lea, County Surveyor.
Ohio	Zanesville	Mar. 8, noon.	Bldg. 85-ft. span, 14-ft. roadway, over Creek in Meigs twp	L. E. Brelsford, County Auditor.
New Jersey	Woodstown	Mar. 8, 1:30 p.m.	Steel superstructure of bridge over Salem Creek	L. S. Prickett, French's Hotel.
Minnesota	Garland	Mar. 8, 2 p.m.	Furn. 6,000 ft. 3-in. plank, 16 ft. long; 100 stringers, 8 ft. long and 32 stringers, 32 ft. long	Hans Christensen, Town Clerk.
California	Fillmore	Mar. 9, 2 p.m.	Bldg. sub and superstructure, 7-span steel bridge, 919 ft. long, roadway 18 ft. wide, solid timber floor, 2 1-3-in. asphalt wearing surface, 12 steel cylinders, 2 concrete abutments, partly reinforced, inc. 433,370 lbs. structural steel, 533 cu. yds. concrete, 2,717.5 lbs. cor. steel, piles, lumber, etc	J. B. McClcskey, County Clerk.
Ohio	Columbus	Mar. 9, noon.	Bldg. sub. and superstructures, floors, etc., of bridges	F. M. Sayre, County Auditor.
Florida	Pensacola	Mar. 10.	Bldg. wooden trestle 400 ft. long for Pensacola Invest. Co.	Investment Co., 225 Brent Bldg.
Ohio	Toledo	Mar. 11.	Bldg. rein. concrete culvert, gate chamber, pipe, etc	Reynold Voit, Sec'y Bd. Pub. Serv.
Ohio	Cleveland	Mar. 13, 11 a.m.	Bldg concrete bridge, concrete arch and concrete culvert	A. B. Lea, County Surveyor.
California	Los Angeles	Mar. 15, 2 p.m.	Bldg. rein. concrete bridge on Mission St., Alham. road dist	C. G. Keyes, County Clerk.
Illinois	Geneva	Mar. 15, 7:30 p.m.	Bldg. rein. concrete hwy. bridge over Fox river at State St.	Oscar Nelson, City Clerk.
Ohio	Coshocton	Mar. 15.	Bldg. 2 bridges; Waddell & Harrington, Kan. City, Mo., Engrs	County Commissioners.
Nebraska	Nebraska City	Mar. 18.	Constructing steel and wooden bridges during 1909	County Commissioners.
Louisiana	Harrisonburg	Apr. 5, noon.	Bldg. steel bridge at Bushley Bayou; also repairing one	H. W. Bethard, Clk. Police Jury.
			LIGHTING AND ELECTRICITY	
California	Patton	Mar. 5, 8 p.m.	Furn. energy for lights and power for State Hospital for 2 years from April 15	Dr. E. Scott Blair, Supt. State Hosp.
Wisconsin	Milwaukee	Mar. 5, noon.	Lighting with naphtha or other illuminants parks and parkways for 3 or 5 years	Daniel Erdmann, Chm. Park Bd.
Nevada	Goldfield	Mar. 6.	Furn., install. and maintaining twenty 1200 c.p. electric arc lights for lighting streets until Jan. 1, 1911	Jos. Hamilton, Co. Clk., Hawhtorne
Indiana	Indianapolis	Mar. 8.	Electric lighting, heating, etc., for new $600,000 City Hall	Geo. M. Brill, C.E., care of Bd. Pub. W.
North Carolina	Charlotte	Mar. 15.	Lighting streets and other public places with electricity for 5 years from Aug. 15; not less than 250 arc lamps, possibly 350 or more 6.6 amperes, 70 volts at arc; also erect, etc., poles, etc.	A. H. Washburn, Chm. Light Com.
Florida	Jacksonville	Mar. 15.	Bldg. $3,000,000 power plant for Suwanee River Elec. Pow. Co.	D. G. Ziegler & Co., Engrs.
Maryland	Berlin	Mar. 16, 11 a.m.	Bldg. electric light plant and water works system, inc. poles, lines, wiring and street lamps; power plant bldg.; foundation for machinery, etc., equipment, inc. 100 h.p. boiler, 50 k.w. gen. unit, switchboard, piping, etc	Orlando Harrison, Mayor.
Iowa	Burlington	Mar. 18.	Furn. three 150 h.p. water tube boilers, set up complete; power house and 54-in. x 125-ft. brick or tile chimney; underground distribution system to 3 schools	D. S. Cooper, Sec'y Bd. Education.
Pennsylvania	Lansdowne	Mar. 20, 8 p.m.	Lighting streets for terms of 5 and 10 years	John W. Davis, Sec'y Boro. Council.
Dist. of Col'bia	Washington	Mar. 22.	Furnishing electrical supplies, etc., for Bur. Eng. & Printing	Joseph E. Ralph, Dir. B. E. & P.
Ohio	Wooster	Mar. 22, noon.	Lighting sts., etc., for 10 years, begin 5 mos. from date of cont.	C. W. Van Nest, Clk. Bd. Pub Serv.
South Carolina	Sumter	Mar. 23, noon.	Furn. 50 enclosed incan. arc lights, 2,000 nom. c.p., all within one mile radius; all night service every night; also 50 to 80 add'l lights; 10-year contract from Nov. 1	C. M. Hurst, City Clerk.
			MISCELLANEOUS	
New York	Buffalo	Mar. 5, 11 a.m.	Bldg. Subd. A, Sec. No. 2, Buffalo riv. & Cazenovia Cr'k Imp.	F. G. Ward, Com'r Pub. Wks.
Indiana	Indianapolis	Mar. 8.	Erecting City Hall; also plumbing, heating and lighting; cost, $600,000; Rubush & Hunter, Archts	Charles M. Bookwalter, Mayor.
California	Pasadena	Mar. 9.	Furnishing 50 painted Oregon pine benches for parks	City Clerk.
Ohio	Sandusky	Mar. 15, noon.	Collection of garbage and offal, dead animals, etc., for 5 years	John J. Molter, Pres. Bd. Health.
Massachusetts	Boston	Mar. 15, 2:30 p.m.	Bldg. Fens gate-house; foundation in place	H. A. Miller, C. E., Riv. Basin Com.
South Carolina	Sumter	Mar. 23, noon.	Furn. 3,500-lb. hook-and-ladder truck, equipped with 150 ft. ladders, 35-gal. chemica tank or 2 each of 3 and 5-gal. extinguishers, f.o.b. Sumter	C. M. Hurst, City Clerk.
Wisconsin	Milwaukee	Mar. 31, 10:30 a.m.	Bldg. refuse incineration plant, complete, except superstructure of bldg. and chimney, as stated in Feb. 10 issue	Chas. J. Poetsch, Chm. Bd. Pub. Wks.
Uruguay S. A.	La Paloma	Apr. 2.	Construction of harbor	Dept. of Pub. Wks., Montevideo.
Indiana	Lebanon	Apr. 5, 1 p.m	Remodeling the County jail	B. F. Herdrick, County Auditor.
New York	New York	Apr. 15.	Furn. petrol motor hose wagon for Shanghai, China	Fearon, Daniel & Co., 96 Wall St.
Illinois	Chicago	Sept. 15.	Furn. voting machines up to $100,000 value	Election Commissioners.

STREET IMPROVEMENTS

Bessemer, Ala.—Council has passed an ordinance providing for the paving of Third avenue.

Mobile, Ala.—General Council has approved the proposed extensive paving venture of the Board of Public Works and authorized a $320,000 bond issue to carry out the project.

Tuscaloosa, Ala.—Council has adopted an ordinance providing for the issuing of $2,400 improvement bonds for concrete work on University avenue.

Haywards, Cal.—Declarations of intention made by the Board of Town Trustees provide for a large amount of street work to be done during the coming summer; new streets are to be opened below Castro street from the northern to the southern limits and the southern end of Castro street is to be bituminized under the Vrooman act; bids for the work are to be received at the next meeting of the Board.

Oakland, Cal.—Council is considering the improvement of Ledmond avenue.

Oakland, Cal.—City Engineer F. C. Turner has prepared a communication which he will forward to the City Council, requesting that plans be made immediately for the various street improvements to be made during the ensuing fiscal year.

Pasadena, Cal.—Citizens are circulating petitions for the paving of Summit and El Moline and North Euclid avenues.

Sacramento, Cal.—The Street Committee has rejected all bids for relaying granite blocks on Third street; lowest bid, $1,735, was considered too high. Property owners on Twenty-first street, from R to Y, are planning some extensive improvements; it has been practically decided to put down an asphaltum pavement.

Bridgeport, Conn.—Business men on Main street have asked for wood blocks instead of the new hard surface pavement which is being planned by the Council Committee on Streets and Sidewalks.

Hartford, Conn.—The City Plan Commission has estimated that the cost of grading and improvement of the proposed Brookfield street, along the southwest branch of Park River, as per the plan of Major James P. Allen, will cost $23,000, not including stoning and macadamizing; the Street Board is considering a petition for the macadamizing of Pliny street.

Waterbury, Conn.—City Engineer R. A. Cairns has estimated the cost of proposed paving as follows, bithulithic brick, asphalt and wood being in the order given: West Main street, $25,000, $26,700, $27,500, $32,850; East Main street, $8,400, $8,700, $9,000, $10,750; Grand street, $20,850, $21,550, $22,250, $26,550; and Meadow street, $27,500, $28,500, $29,450, $40,100.

Washington, D. C.—Engineer Commissioner Cosby has issued orders that the roadway of South Capitol street, from Virginia avenue to G street, be graded and paved with old granite block, at an estimated cost of $1,000; also the roadway of Fourteenth street, southeast, between E and G streets be repaired, at a cost not to exceed $100.

Washington, D. C.—The U. S. Senate has added to the army appropriation bill a $44,000 appropriation for a road from the south end of the Highway bridge to the Arlington and Ft. Myer reservation; Senate also passed bills authorizing a change in the system of highways in the vicinity of Glenwood Cemetery; the widening of Twentieth street north of Park Road; the extension of Ninth street; widening and extension of Minnesota avenue; extension of Girard and Rittenhouse streets and extension and widening of Massachusetts avenue.

Pensacola, Fla.—Chairman R. E. L. Daniels has recommended to the Board of Public Works that such funds as may be necessary be appropriated to bring all streets to a proper grade; at least $15,000 will be needed, as twenty miles of cement walks are to be constructed.

Perry, Fla.—Citizens will vote March 16 on $15,000 bonds for street improvements. John C. Calhoun, County Clerk.

Aurora, Ill.—Seminary avenue will be paved this year; plan now favored and which, city officials say will be adopted, calls for paving the street between Broadway and Fifth street.

Galesburg, Ill.—City Engineer F. M. Connolly has estimated the cost of laying a brick pavement on Pine street at $24,905.55.

Rockford, Ill.—Council passed ordinances, calling for work to be done as soon as possible on Second avenue and Baker street; cost, $980; Winnebago street, $610, and Kent street, $1,285.—S. B. Hand, City Engineer.

Evansville, Ind.—The Board of Public Works has ordered the vacation of seven streets and the opening of four in Baptisttown.

Indianapolis, Ind.—The Board of Public Works has ordered plans for the following: For graded roadway curb and cement walks in Park avenue; for grading and graveling roadway on Bismarck avenue; for graded roadway, curb and cement walks in Ruckle street; for graded roadway and curb in Central avenue; for cement walks in Forty-second street; for cement walks in Fortieth street; for cement walks in Highland drive; for cement walks in Thirty-eighth street; for roadway, curb and cement walks in Broadway, and for cement walks in College avenue.

Indianapolis, Ind.—The Board of Public Works has ordered plans for graded roadway, cement walks and stone curbing in Dearborn Street; also for sewer in College Avenue; final action has been taken for asphalt roadway in Dickson and Vermont Streets and for brick roadway and curbing in Lincoln Street.

Indianapolis, Ind.—A petition has been received by the Board of Public Works to extend Force street south to the city limits. Plans have been ordered for the paving of the alley between Holman and Montgomery streets.

Mishawaka, Ind.—The Committee on Streets and Alleys has recommended the paving of West Second Street with brick.

Petersburg, Ind.—Pike County is having plans prepared for the construction of 22 miles of gravel and macadamized roads; cost, $65,000.

Rushville, Ind.—Council has passed on petition asking that Second street be paved from Hodges branch to East Hill Cemetery, east of the city; improvement is to be made under the three-mile road law.

Davenport, Ia.—Bids have been rejected for paving Sixth street and new ones will be advertised for; only bidder was the McCarthy Improvement Company, who bid $1.84 per square yard for asphalt and same for brick.

Davenport, Ia.—Council has called for bids for the grading of the following streets: South Davie, Fifteenth, McKinley avenue and Tenth.

Davenport, Ia.—City is considering the improvement of the following thoroughfares: Bridge avenue, estimated cost, $680.50; Iowa street, $637.60; Pleasant street, $595.60; Alley between Fifth and Sixth streets, $1,193.70; Fillmore street, $3,868.80. Hugo Moeller, City Clerk.

Sioux City, Ia.—Work on the Perry and Bacon Creek conduits, the Wall Street viaduct, and the vast amount of paving planned for the season, will likely start as soon as the frost is out of the ground; estimated expenditures for these improvements this season are: Conduits, $100,000; viaduct, $200,000; paving, $150,000; total, $450,000; in addition to this, plans are rapidly forming for at least six miles of combined guttering and curbing, 10 miles of sidewalks, several miles of sanitary sewers, and a large number of cement crossings, the whole topping the half million mark.

Sioux City, Ia.—Commissioner Ford is urging the purchase of a 10-ton steam or gasoline road roller.

Kansas City, Kan.—The Kansas City Implement, Vehicle and Hardware Dealers' Club will ask the Board of Public Works to repair the west bottom streets.—J. W. Wilson, President.

Lexington, Ky.—City Engineer O'Neill is considering the improving of West Main street.

Lexington, Ky.—The Board of Public Works will soon take up the reconstruction of London avenue; Board is also considering extensions of Broadway, Upper and Mill streets.—P. P. O'Neil, City Engineer.

Louisville, Ky.—Lawrence Reichart and other members of the West End Improvement Club have called upon Mayor Grinstead to urge the improvement of Thirty-fifth, from Broadway to Chestnut street.

New Orleans, La.—The Budget Committee has reported favorably on ordinances appropriating $3,500 for the opening and widening of Eleonore Street; for paving with small granite block South Poydras; for paving North Poydras and for sidewalks in Kentucky Street.

New Orleans, La.—The General Contract Company, P. O. Box 630, is considering purchase of four cars of about 25 cubic yards each of crushed stone for concrete.

Baltimore, Md.—The City Engineer and Commissioners for Opening Streets are making arrangements for the expenditure of more than $700,000 for street paving this year, while the Good Roads Commission will in a few days announce the streets to be paved within the city limits from the city's share of the good roads fund; this will amount to $200,000 a year for five years; Commissioners for Opening Streets will spend the last $500,000 of the $2,000,000 Annex loan and it will be used exclusively for improvements in the Annex; $200,000 from the Good Roads Commission will be spent in the Annex; in this year's ordinance of estimates there is appropriated $219,369 for new pavements within the old city limits, while $254,400 will be spent in repairing streets and roads; both departments are preparing specifications for improving the selected streets and it is expected that bids will be asked within the next month so that the contracts can be let and work on the improvements commence as soon as the weather permits; the streets to be improved within the old city limits are: Wolfe street, Fulton avenue, O'Donnell, Lanvale and Clement streets, Wilson street, McCulloh street, Fremont avenue, Eager street, Oliver street, William street, Ostend avenue, Valley, Ann, Ensor, Callender, Chester and Alsquith streets; also Park avenue.

Rockville, Md.—When the Maryland Good Roads Commission meets in Baltimore to definitely determine which roads throughout the State are to be improved with the $5,000,000 authorized by the last Legislature to be expended for road construction there is believed to be little doubt that the route tentatively agreed upon for this county will be definitely adopted; route extends from the District of Columbia line to Hyattstown, by way of Rockville, Gaithersburg and Clarksburg, and is 27 miles in length.

Cambridge, Mass.—Proposals for furnishing the city with the following schedule of street building materials, in such quantities as may be needed during the season of 1909, will be received March 3, at noon; materials needed include sidewalk bricks, straight granite edgestone and circle granite edgestone, granite paving blocks of Cape Ann stock, granite paving blocks of New Hampshire or Chelmsford stock, granite flagging, granite block gutter stone, trap rock crushed stone, such quantities of paving gravel as may be needed during the present season and Portland cement.—G. M. Clukas, Superintendent of Streets.

Falmouth, Mass.—Town Council has passed appropriation of $5,500 for stoning the road leading from Teaticket to Falmouth Heights with amendment that the Highway Surveyor, with the advice and consent of the Selectmen, may use in place of stone any other material that will make a road of equal value as a stone road, provided the cost is no more; road is to be completed May 15.

Lawrence, Mass.—The Board of Trade is considering the better paving of streets.

Lawrence, Mass.—The Hampton Beach Improvement Society is urging the repair of the beach road and the oiling of the same.—A. W. Saunders, Lowell.

Malden, Mass.—Council has ordered City Engineer to prepare plans and estimate cost of extending Glenwood street.

Gulfport, Miss.—Council has ordered the paving of sidewalks in front of beach property from Fifteenth Street, on the east, and from Thirtieth Avenue to Thirty-eighth, on the west; Council will also build a shell drive this entire distance, with a cement curb on the beach side.

Coffeeville, Miss.—City is considering laying of concrete sidewalks.—P. M. Woodall.

Laurel, Miss.—City will issue $20,000 bonds, $10,000 for street improvements and $10,000 for extensions of the water works system.

Carterville, Mo.—Plans are being prepared by City Engineer Frank Funk for blocks of brick paving on Main street.—H. E. Moody, City Clerk.

Kansas City, Mo.—A public hearing on the following resolutions for artificial stone sidewalks is to be held by the Board of Public Works on March 12: Olive, Penn, Forty-fifth, McCoy, Forty-third, Forty-second, Mercier, Tracy, Euclid, Missouri, Seventeenth, Lawndale, Chelsea, Fifth, Fortieth, Twenty-eighth, Twenty-seventh, Twenty-fourth, Lister, Fairmount, Thirty-eighth, Indiana, Wheeling, Monroe, Twenty-sixth and Thompson Streets.

Springfield, Mo.—Plans are being prepared by Engineer H. G. Horton for four blocks of brick paving on Market, College and Center streets.—G. W. Hackney, City Clerk.

Springfield, Mo.—City and the Springfield Traction Company are considering the paving with brick the Public Square.—G. W. Hackney, City Clerk; H. G. Horton, Engineer.

Bayonne, N. J.—Council has ordered the improvement of West Forty-second and Twenty-second streets.—W. C. Hamilton, City Clerk.

Collingswood, N. J.—Borough is again urging the improvement of Haddon avenue; surveyors are at work; borough will pay 10 per cent. of expenses.

Montclair, N. J.—Council has ordered $10,000 worth of street improvements.

Newark, N. J.—Street improvements representing an aggregate expenditure of approximately $200,000 have been passed upon by the Board of Works; work consists of paving and repaving of streets, grading, curbing and flagging and the construction of four sewers. Streets to be paved are as follows: Pierce street, brick; Garrison street, bitulithic; Earl street, brick; Orange place, granite block; Pearl street, brick;

Shipman street, brick; Augusta street, granite block; Camfield street, brick; Arlington street, brick; Nichols alley, brick; Rector street, brick; Hill street, brick; Prospect street, wood block; Comes alley, brick; Thomas street, granite block. Curbing, grading and flagging work is as follows: Delaney street, Hedden street, North Sixth and North Seventh streets, Seymour avenue, Woodside avenue, South Fifteenth street, Grove street, Chadwick avenue, Hawthorne avenue and Peshine avenue.

Newark, N. J.—Road improvements aggregating an approximate outlay of $90,000 have been decided on by the Road Committee of the Board of Freeholders; seven of the thoroughfares to be paved are Mt. Pleasant avenue, West Orange; River road, Nutley, between the Belleville line and Passaic County, a distance of 6,450 feet; Pleasant Valley road, for a distance of 3,100 feet in Verona and 22,000 feet in West Orange; Short Hills road, for 5,000 feet in Milburn and 4,750 feet in Livingston; Cedar street, Livingston, between Northfield road and Roseland avenue, a distance of 9,000 feet; Lane avenue, for 5,600 feet in West Caldwell and 1,700 feet in Essex Fells and the Mountain avenue extension, in Caldwell, for a distance of 350 feet between the old road and Bloomfield avenue; State will pay one-third of the entire cost, each municipality one-tenth of the cost of the road within its limits and the county the balance; on Mt. Pleasant avenue Telford paving will be laid under a new formula prepared by County Engineer James Owen; instead of a clay binder, liquid asphalt will be used.

Nashua, N. H.—A communication has been received from the Board of Public Works asking for an annual appropriation of $41,000 for regular work and $5,000 for State highways.

Canandaigua, N. Y.—The Committee on Good Roads is considering the widening and improving the road through the village of Stanley; width may be increased to 16 feet for a distance of 2,300 feet and stone gutters placed on each side.

Geneva, N. Y.—The Board of Public Works has adopted a paving program for the current year which consists of the improvement of Washington street from the present end of the brick pavement to Reed road, Elm, Colt and Canal streets; estimated cost of the four streets is $52,941.—C. T. Church, City Engineer.

Kingston, N. Y.—Senator Cordts has introduced a bill authorizing the city to issue bonds in the sum of $170,000 for the paving of streets; bonds will bear interest at not exceeding 4½ per cent., payable semi-annually.

New York, N. Y.—Though it will have to be ripped open again if the city proceeds to build the Fourth avenue subway, bids for which are now pending, the Board of Estimate has voted to pave the Flatbush avenue approach to the new Manhattan Bridge at a cost of $124,000.

Seneca Falls, N. Y.—The Board of Trade is considering the paving proposition, which had been investigated by a committee, of which Norman J. Gould was the chairman; report from the committee showed that seven miles of streets had been surveyed, and that the cost of paving had been estimated on all asphalt sheet pavement, and on asphalt on some of the streets and macadam on others, all of which is shown below; report of the Consulting Engineer shows that there would be 113,215 square yards of pavement, which would require 46,509 cubic yards of excavation; there would be 69,910 linear feet of 4-inch curbing; 2,670 linear feet of protecting curb; 72,531 linear feet of 3-inch drain-tile; 18,938 linear feet of vitrified pipe, 77 catch basins, 24 inlets; cost of engineering, advertising and inspecting would be $36,120; cost of the asphalt pavement would be $396,304, and the cost of the combined asphalt and macadam pavement would be $346,041, of which the asphalt would cost $191,646 and the macadam $154,395; streets that would receive asphalt would be State and Cayuga, Ovil, Water, Bayard and Fall; streets that would be paved are Rumsey, Clinton and Mynderse, Cayuga and State, Ovid and Bridge, Water, Bayard and Fall.

Utica, N. Y.—Council has adopted an ordinance received from the Finance Committee providing for the issuance of $20,260.28 local improvement bonds for paving various streets.

Charlotte, N. C.—The Finance Committee has appropriated $9,000 for new cement sidewalks in fire limits.—Joseph Firth, City Engineer.

Charlotte, N. C.—Finance Committee is contemplating the paving of East Avenue with bitulithic; estimated cost, $32,000.

Graham, N. C.—Almance County will soon advertise for bids on grading and macadamizing of about $200,000 worth of roads.—Gilbert C. White, Durham, N. C., Engineer.

Selby, N. C.—Citizens will vote on $300,000 bond issue for road work in Cleveland County.

Cincinnati, O.—Bids will be received, March 3, noon, for furnishing refined asphalt for use of the Street and Sewer Repair Department.—J. J. Wenner, Clerk Board Public Service.

Cincinnati, O.—The Board of Public Service has transmitted resolutions for the improvement of Fairmount avenue with bowlders; Grove street, with bowlders; Halstead street, with macadam; Burns street, with wood blocks; Virginia avenue, with macadam; resolutions have been reported from the Committee on Streets and Parks and passed for the improvement of Gest street, with granite; Hopple street, with bowlders; also Hooker street, with macadam; Board of Public Service has transmitted approximate estimates of the cost of certain proposed street improvements, as follows: Ethan avenue, with brick, $10,054.10; South street, with brick, $8,196.25; also Gest street, $92,934.

Cincinnati, O.—City Engineer Sundmaker has estimated the cost of improving Ehrman avenue with crushed stone at $12,888 and paving portions of Rose Hill and Beechwood avenue with wood block, at $64,908.

Dayton, O.—Street Superintendent Huffman has asked for an appropriation of about $40,000 for the repair of the city streets, $25,000 for the asphalt streets and $15,000 for the gravel streets.

Hamilton, O.—Council is considering ordinances instructing the Board of Public Service to lay crossings at Oak Street and Millville Avenue and Franklin and G Streets; instructing the City Civil Engineer to prepare plans and estimates for paving C and D Streets and to advise Council as to the kind of material most suitable to be used; to prepare and report a grade for Mill Road and to prepare plans and estimates for continuing the paving on North Second Street.

Lima, O.—An issue of bonds in the sum of $75,000 has been authorized by Council to carry out projected street paving improvements for which legislation has been passed with no funds for the city's share; more than $200,000 is expected to be expended in street paving here during the coming year, and work will be started at soon as possible to furnish work for the unemployed.

Minster, O.—Bids will be received March 20, noon, for $4,000 Frankfort street improvement bonds; also for $2,500 electric light bonds.—J. H. Laufersweiler, Village Clerk.

Springfield, O.—Council has decided to pave a portion of College avenue.

Toledo, O.—A movement has been started by Councilman Clark and a Committee of the Chamber of Commerce, headed by Postmaster William H. Tucker, to complete the paving on Summit street from Michigan avenue to Bay View Park. The Park Board proposes to macadamize the road leading from Summit avenue to the Yacht Club and around through the park.

Toledo, O.—The Service Board has asked Council for $60,000 for construction of stone and cement sidewalks this season; Council will issue $20,000 in certificates of indebtedness as a starter.

Toledo, O.—For the purpose of following up the work on the boulevard, Council Committee on Finance has endorsed the authorized issue of $55,000 in boulevard bonds; bonds are the last of $150,000 voted for boulevard purposes in 1907, and the proceeds will be used in boulevard work.

Youngstown, O.—Mahoning County Board of Commissioners will receive bids about March 1 for about 25 miles of macadam pavement; Engineers Smith & Turner, Dollar Savings Bank Bldg., are preparing plans.—James Price, Commissioner, 215 Dollar Savings Bank Bldg.

Ardmore, Okla.—An election will be held March 23 on $35,000 street improvement bonds.

Coalgate, Okla.—City is considering constructing 10 miles of concrete sidewalks.—D. D. Brunson, Mayor.

Holdenville, Okla.—Citizens have voted an $8,000 street improvement bond issue.—I. A. Draper, City Clerk.

Sulphur, Okla.—City will issue from $100,000 to $200,000 street improvement bonds.

Portland, Ore.—Council has rejected for the sixth time bids for the improvement of East Third street; Pacific Bridge Company was the only bidder, but its bid of $72,000 was $3,400 in excess of the estimates of the City Engineer.

Portland, Ore.—Permission has been granted the Portland Railway, Light & Power Company by the City Executive Board to plank a portion of East Water street near East Morrison street.

Altoona, Pa.—City is considering the paving of the following thoroughfares during the coming Summer: Twenty-sixth street, Eighth avenue, Fifth avenue, First avenue, Third avenue, Ninth and Tenth streets, Sixth street, Fifth avenue, Howard avenue, Eighth street, Ninth street, Twenty-second avenue, Fifteenth street, Fourteenth avenue and Thirteenth alley.

Brockwayville, Pa.—Council is considering the paving of Main street through the Borough; E. W. Hess, Engineer, of Clearfield, Pa., and DuBois, Pa., has been retained to prepare maps and plans.

Butler, Pa.—Council will soon award contract for the paving of Fulton street.

Harrisburg, Pa.—Council is considering the opening and grading of Emerald street.—J. H. Knisely, Clerk Select Council.

Mt. Penn, Pa.—Citizens have voted $10,000 bonds for street improvements.—W. H. Dechent, Reading, Engineer; G. C. Hartline, Borough Secretary.

Mount Pleasant, Pa.—Plans and specifications will be prepared at once for paving Eagle and West Walnut Streets with brick; cost, about $55,000; actual work will be started early in the summer, and the contracts will be awarded within the next two months.

Providence, R. I.—The Board of Aldermen has passed resolutions for improvement of Crawford street and Elmwood avenue.

Columbia, S. C.—The South Carolina Good Roads Association has recommended the enactment of a law providing for a State Highway Engineer; so far, General Assembly has taken no action.—Fingal C. Black, C. E., Secretary.

Dallas, Tex.—Bids have been ordered by the Board of Municipal Commissioners for the paving of North Ervay Street from Bryan to Ross.

Dallas, Tex.—The Reiger Avenue Improvement League has asked the City Engineer for estimates on the cost of paving the avenue.

Fort Worth, Tex.—Property owners of Belknap and East Weatherford streets are considering the paving of those streets. T. J. Martin has been elected temporary chairman.

Hondo, Tex.—Medina County citizens will vote April 6 on $40,000 road and bridge bonds.

Houston, Tex.—A petition has been presented to Council by a number of citizens of the Fourth Ward, asking that an investigation be made of the conditions which are said to prevail at the corner of Crosby and Saulnier Streets, with a view to making improvements.

Orange, Tex.—Division street will be paved from the Holland Hotel, or Short street proper to Border.

San Antonio, Tex.—City Engineer Giraud has surveyed the route for the proposed extension and improvement of Travis street through to Main avenue by way of Salinas street to Chavez street to the International & Great Northern railway tracks.

Stamford, Tex.—Council has ordered an election for March 26 to decide whether or not the town shall issue $20,000 in bonds for street improvements.

Victoria, Tex.—Citizens are considering a $25,000 bond issue for street improvements and school.—H. Higgins, Clerk.

Weatherford, Tex.—Steps are being taken for the construction of a handsome boulevard lined with beautiful shade trees from the city limits out to the Knights of Pythias Widows and Orphans' Home.

Salt Lake City, Utah.—Plans are being prepared for the opening of a new street east and west through the block bounded by Second and Third south and Second and Third west; Ogden capitalists are behind this scheme, which includes the establishment of a wholesale and commission district on the West Side.

Norfolk, Va.—Plans have practically been adopted and methods mapped out for the laying of granolithic sidewalks in Port Norfolk, that thriving industrial suburb to the westward of the city; the Civic League of Port Norfolk and Pinner's Point has announced that the plan includes a project to lay 2,000 square yards of granolithic pavement during the period intervening between now and July 1 next; no contracts for the work have been awarded, however.

Norfolk, Va.—Proposals will be received by the Permanent Road Improvement Commission of Norfolk County March 1, noon, for the construction of a macadam road from Norfolk City to Great Bridge.—Alvah H. Martin, Chairman; P. St. J. Wilson, State Highway Commissioner.

Orange, Va.—Citizens have voted $5,000 for street improvements.

Staunton, Va.—Augusta County Supervisors have appropriated $4,500 toward building a road from Basic City over the Blue Ridge mountains to Nelson County; a similar amount has already been raised by private subscription; this is the first step toward the building of a public highway from the valley to eastern Virginia and Richmond; work will begin this spring.

Ellensburg, Wash.—Citizens are considering the matter of street pavement.

Seattle, Wash.—The Finance Committee will recommend a $10,000 appropriation for a new roadway around and across Green Lake.

Tacoma, Wash.—Council is considering the improvement of eight streets.

New Cumberland, W. Va.—A new electric light plant will be established.—A. S. Cooper, Promoter.

La Crosse, Wis.—The Street Improvement Committee will pave Mormon and Coulee streets with brick, and King and Berlin streets with macadam; cost, about $30,000.

Racine, Wis.—Council has received a resolution directing the Board of Public Works to prepare plans and specifications for the pavement of Eleventh street with brick; also for the paving of Racine street.

Sparta, Wis.—City is considering brick paving of three blocks with concrete curb and gutter and four blocks macadam paving.—H. Teasdale, President Water Committee.

BIDS RECEIVED AND CONTRACTS AWARDED

Bisbee, Ariz.—Council has received bids for the cement and lumber to be used in the street improvements now under way. The Pioneer Lumber Company and Cochise Lumber Company were the only bidders on the lumber, and as the Cochise company was the lowest bidder, it was awarded the contract to furnish three car loads of lumber. There were five bidders for the cement supply. The Darbyshire & Evans Company, the Moore Fuel & Feed Company, the Copper Queen Company and the Pioneer Lumber Company all bid the same, $2.75 per barrel. A. C. Hurst bid six cents less per barrel and he was awarded the contract. He was asked to furnish a bond of $5,000 for the faithful delivery of the cement. The bids were all for cement f. o. b. Bisbee.

Lake Village, Ark.—Lund & Hill have been awarded contract for 13,000 square feet, 1:2½ cement sidewalks, at 16½ cents per square foot.—Herman Carlton, Secretary, Improvement Board.

Redlands, Cal.—Mushrush & Sprague were awarded the contract for work on Stevenson Avenue, their bid being $4,-269.44; other bidders were George H. Osward, $4,322; J. E. Haddock, $4,777; Chamberlain & Williams, $4,889, and A. W. McDonald, $4,621.

San Bernardino, Cal.—A. Robinson has been awarded a contract for laying 4,000 linear feet cement walk in Magnolia Park.

Upland, Cal.—Wilson & Rose of Alhambra were awarded the contract for street work at $27,000. At a previous meeting, the City Trustees passed on the advertisement of the work and stated during the meeting that the bidders must deposit a certified check along with the bid and at the same meeting instructed the City Clerk to advertise the work. Wilson & Rose were low and the Highland Construction Company next, but the Alhambra concern failed to abide by the advertisement in that they did not deposit a certified check, but in place deposited a bond for the amount. The Trustees then discovered that the Clerk had failed to record the statement in the minutes and consequently the work for the street improvements was awarded to the rival company instead of the Redlands concern. The contract included macadam and oil, tamping the road and putting in a cobble stone gutter on Euclid avenue from South street northward; the macadam work was bid for all the way from 6 to 9 cents per square foot, and the gutter from 31½ cents per linear foot to 70 cents. Bids were also received on the proposed culverts which will be put in at all the street crossings. These ran from $74.50 to $200 for each culvert.—City Engineer Sourwine.

Denver, Col.—Bids were opened, Feb. 16, for constructing stone sidewalks in North Denver Improvement District No. 8, and the contract has been awarded to Geo. Barker for $28,865; other bids received were: Herbert Mann, $29,604; J. Fred Roberts, $30,537; the Dillon Stone Co., $31,260, and the Commonwealth Construction Co., $32,-241. The contract for grading the district has been awarded to J. Fred Roberts for $13,192.

The Board of Public Works also awarded the contract for paving with concrete 71 alleys in Capitol Hill Paving District to the Commonwealth Construction Co., Colorado Bldg., for about $80,000.—Andrew Rosewater, City Engineer.

Atlanta, Ga.—Nicholson Sons, city, have contract to construct 50-foot macadamized road from East Lake Country Clubhouse to Georgia Railroad, distance of one and one-half miles, where it will connect with Ponce de Leon avenue in Druid Hill Park; cost, $8,000; Ponce de Leon avenue through the park will also be paved.

Savannah, Ga.—Venable Brothers of Atlanta have been awarded contract for constructing 7,500 square yards granite block 6 inches thick on sand foundation, at 98½ cents per square yard; other bidders were: F. H. Opper, city; Neal-Blun Company, city; Mt. Airy Granite Company, Mt. Airy, S. C.; Geo. W. Parkhill, Jacksonville, Fla.—Harry Wellink, Director of Public Works.

Denver, Colo.—The contract for laying sidewalks in North Side Improvement District No. 8 has been awarded by the Board of Public Works to George Barker, at $28,-863; the district concerned extends between Tejon and Zuni and Thirty-fourth and Forty-fourth streets; the contract for the grading in the same district was let to J. Fred Roberts.

Galena, Ill.—John Bastian and Joseph J. Bauer were awarded contract for paving of upper Franklin street by the Board of Local Improvements at $1.50 per square yard for brick paving and 20 cents per linear feet for curbing; the plans and specifications call for 7,200 square yards of paving and 2,936 linear feet of curbing.

Indianapolis, Ind.—The Board of Public Works has accepted bid for cement walks and curb in Finley avenue, from Shelby to Boyd; F. H. Abel, $1.43; for brick roadway, with gas, water and sewer connections in Spring street, from Ohio to Market, Julius Keller Construction Company, roadway $2.80, gas connections 50 cents, water connections 75 cents, sewer connection 75 cents, and for brick roadway, stone curb, gas, water and sewer connections in Rural street, from Washington to first alley south of Moore avenue, American Construction Company, roadway and curb $3.80, gas connections $6, water connections 75 cents, sewer connections, 75 cents.

Muncie, Ind.—E. A. Freshwater & Sons have secured contract for grading, curbing and paving 1¼ miles of streets and roadway in Muncie and extending beyond the city limits for $50,000.

Terre Haute, Ind.—The Board of Commissioners of Vigo County have let contracts for constructing gravel roads, as follows: Jos. P. Peters, Terre Haute, $10,-300; James Robertson, Prairieton, $11,472; Bolan White, Prairieton, $4,300; Ryan Briggs, Clinton, $2,985.

Davenport, Ia.—The contract for laying permanent sidewalks has been let to the Hydraulic Concrete Construction Company.

The Davenport Construction Company was the lowest bidder for the paving on Eleventh between Iowa and LeClaire, Ninth between Iowa and Farnam, Gaines between Fourth and Eighth, and the alley between Front, Second, Scott and Western avenue in the bids opened February 16 and was awarded contract later by Council. The McCarthy Company was low on asphalt work on Sixth from Warren to Marquette, but it was decided to readvertise. Following are the bids:

Alley on Front: Hydraulic Concrete Construction Company, excavation, 37 cents; brick paving, $1.53. Independent Construction Company, excavation, 40 cents; brick paving, $1.60. McCarthy Improvement Company, excavation, 44 cents; brick paving, $1.50. Davenport Construction Company, excavation, 40 cents; brick paving, $1.48.

Sixth street: McCarthy Improvement Company, excavation, 44 cents; asphalt paving, $1.84; brick paving, $1.84; combined curb and gutter, 66 cents.

Eleventh street: J. B. Frahm Company, excavation, 40 cents; brick paving, $1.50; curbing, 35 cents. Hydraulic Concrete Construction Company, excavation, 37 cents; paving, $1.58; curbing, 35 cents. Independent Construction Company, excavation, 40 cents; brick paving, $1.63; curbing, 30 cents. McCarthy Improvement Company, excavation, 44 cents; brick paving, $1.54; curbing, 30 cents. Davenport Construction Company, excavation, 40 cents; brick paving, $1.49; curbing, 28 cents.

Ninth street: J. B. Frahm Company, excavation, 40 cents; brick paving, $1.50; curbing, 33 cents. Hydraulic Concrete Construction Company, excavation, 37 cents; brick paving, $1.57; curbing, 35 cents. Independent Construction Company, excavation, 40 cents; brick paving, $1.62; curbing, 30 cents. McCarthy Improvement Company, excavation, 44 cents; brick paving, $1.54; curbing, 30 cents. Davenport Construction Company, excavation, 40 cents; brick paving, $1.49; curbing, 28 cents.

Gaines street: J. B. Frahm Company, excavation, 40 cents; brick paving, $1.56; curbing, 32 cents. Hydraulic Concrete Construction Company, excavation, 50 cents; brick paving, $1.57; curbing, 30 cents. Independent Construction Company, excavation, 40 cents; brick paving, $1.62; curbing, 30 cents. McCarthy Improvement Company, excavation, 40 cents; brick paving, $1.52; curbing, 30 cents. Davenport Construction Company, excavation, 40 cents; brick paving, $1.47; curbing, 28 cents.

Lawrenceburg, Ky.—The Hammonds Creek & Salt River Turnpike Company has been incorporated by G. C. Hoffman, J. M. Wilson, William Sherwood and others.

Covington, La.—City has awarded contract to F. F. Plauch, of Covington, for grading 15 miles of streets.

New Orleans, La.—Bids were opened by the Park Board for the construction of 5,300 feet of concrete curbing about the drives in City Park and for the 3,500 feet of sidewalk in and about Central Square in East Dallas. The bids were as follows:

On City Park curbs: R. C. Stubbs and Arnold & Nutter, 24 cents per linear foot, the two bids being identical; William Dietz, 33 1-3 cents; F. Brin 30 cents; Selman & Reischling, 38 cents; Texas Concrete Construction Company, J. F. Zang, president, 33 cents; J. C. Meigs, 30 cents; Dallas Paving Company, 30 cents; Klein Bros., 35 cents.

On Central Square work: Arnold & Nutter, on flat work, 11 cents per square foot; on combination curb and gutter, 57 cents. Selman & Reischling, flat work 11¾ cents; curb and gutter, 59 cents. Texas Concrete Construction Company, flat work, 11 cents; curb and gutter, 57 cents. Dallas Paving Company, flat work, 11¼ cents; curb and gutter, 55 cents, with 5 cents linear foot extra for radius curb. Klein Bros., flat work, 12 cents; curb and gutter, 59 cents.

The following bids have been reported favorably to Council by the Finance Committee: The Southern Bitulithic Company, for the paving of Walnut street with bitulithic, from Esther to Magazine, at $38,824; the Southern Bitulithic Company, for the paving of Robert street, from Dryades to South Rampart, at $5,656.86; the Southern Bitulithic Company, for the paving of the lower side of Esplanade avenue with bitulithic, from Claiborne to Galvez street, at $28,312.20; the Etta Contracting Company, for the repaving of Ursuline street with small granite block, from North Peters to Decatur street, for $2,739.50; the Etta Contracting Company, for the repaving of Calliope street with small granite and existing square granite block, from Annunciation to South Peters street, for $24,565.40; Rudolph S. Blome Company, for paving Lopez street with granitoid, from Tulane avenue to Poydras street, at $31,709.65; Rudolph S. Blome & Co., for the paving of Lopez street with granitoid, from Tulane avenue to St. Louis street, for $70,699.40; Southern Bitulithic Company, for the paving of Joseph street with bitulithic, from Prythania to Camp street, for $33,970.50.

Baltimore, Md.—The Board of Awards, Feb. 17, awarded contract for sheet asphalt to be used in repair work on city streets by the City Engineer's Dept. to F. E. Schneider Paving Co., Law Bldg., for $21,983.—B. T. Fendall, City Engineer.

Rockville, Md.—The County Commissioners have awarded to the McKay Construction Company, of Philadelphia, the contract for the construction of a Shoemaker pike from Kensington, Montgomery County, to Bradley lane, Chevy Chase, a distance of about 3¼ miles, the price being about $31,000.

Lansing, Mich.—The following bids were received, Feb. 23, for paving Shiawassee street: Farrell Bros.—Carlyle block, $4,000; Wooster block, $3,800; Michigan paving block, $3,800; Bessemer block, $4,100; Portsmouth block, $4,100; Metz block, $4,-100; Wassall block, $4,100; Bolen block, $4,-100; Athens block, $4,000; Nelsonville block, $4,000; Saginaw block, $4,000. Kneal & Ryan—Townsend block, $3,727.40; Athens block, $3,727.40; Wooster block, $3,727.40; Wassell block, $3,835; Bolen block, $3,835; Bessemer block, $3,835; Saginaw block, $3,-835; Carlyle block, $3,835; Portsmouth block, $3,835. McKale & Clark, $4,150. S. Champion, $4,033. J. H. Algate, $4,300.

The following bids were received for paving Cedar street: Farrell Bros.—Carlyle block, $22,546; Bessemer block, $23,046.90; Portsmouth block, $23,046.90; Metropolitan block, $23,046.90; Wassell block, $23,046.90; Bolen block, $23,046.90; Michigan block, $22,369.50; Wooster block, $22,369.50; Athens block, $22,821; Nelsonville block, $22,821; Saginaw block, $22,821; Champion block, $22,200. Kneal & Ryan—Townsend block, $22,411.60; Nelsonville block, $22,-411.60; Wooster block, $22,411.60; Wassell block, $22,834.50; Bessemer block, $22,834.50; Saginaw block, $22,834.50; Bolen block, $22,834.50; Carlyle block, $22,-834.50; Portsmouth block, $22,834.50. J. H. Algate, $23,700. S. Champion, $23,098. McKale & Clark, $22,100.

Joplin, Mo.—V. E. Koch was awarded the contract, at $8,946.50, for grading and paving with vitrified brick, Fifth street, from a line 4½ feet west of and parallel to center lines of main track of the Kansas City Southern Railway Company to east line of Main street.—Hiram Phillips, City Clerk; J. B. Hodgdon, City Engineer.

Kansas City, Mo.—The Board of Public Works, Feb. 16, awarded contracts for paving, as follows:

Sandstone block paving: To Boyd Construction Co. for paving portions of Union street, at $3.07 per sq. yd., and to M. Mense, for Tenth street, from Wyandotte street to Main street, $2.97.

Asphalt paving: To Cleveland Trinidad Paving Co. for paving Wyoming street, $2.18 per sq. yd.; Ninth street, $2.08; McGee and Twenty-fourth streets, $1.96, and

Chestnut street and Mastin place, $1.98, and Lynn avenue, $2.25. To Barber Asphalt Co. for paving Scarritt and Grauman avenues, $1.89, and Eleventh street and Denver avenue, $1.88, and Thirty-fourth street, $2. To Parker-Washington Co. for Mercier street, $1.84; Forty-second street and Tracy avenue, $1.85; Forty-first street, $1.86; Fortieth street, $1.89; Thirtieth street and Corbin Terrace, $1.90; Twenty-fourth street, $2.25, and Metropolitan Engineering & Construction Co. for Thirty-fourth street, $2.

Elizabeth, N. J.—Bids were received by Council February 15 for paving Erie street, from First avenue to Third avenue, with brick pavement on a 6-inch concrete foundation. Bids were as follows: O'Neill & Viscount, $15,300; Wade & Callahan, $15,297; De Rosa & Jaques, $15,055; James J. Potts, $14,846; New Jersey Paving Corporation, $15,792; J. F. Shanley & Company, no given amount; J. Irwin & Company, no given amount.

Bids were also submitted as follows for paving Geneva street with brick pavement, from Elizabeth avenue to Third avenue: New Jersey Paving Corporation, $16,372; De Rosa & Jaques, $16,607; O'Neill & Viscount, $15,832; James J. Potts, $15,400; J. F. Shanley, no given amount; Wade & Callahan, $15,863. The bids submitted by J. Irwin & Company for paving Erie street and by J. F. Shanley & Company for paving Erie and Geneva streets gave only quotations on the price of the brick per square yard; all were referred to the Committee on Streets and Highways.—W. H. Luster, Jr., City Engineer.

Brooklyn, N. Y.—The Cranford Company, 190 Montague street, has been awarded contract by Bird S. Coler, Borough President, for regulating and paving with asphalt on a concrete foundation Prospect place, from Buffalo avenue to Rockaway avenue, at the following prices: 12,900 square yards asphalt pavement, 5-year maintenance, $1.07, and 1,800 cubic yards concrete, $5.75; total, $524,153. Other bidders were: Uvalde Asphalt Company, 1 Broadway, New York, $28,215; Barber Asphalt Company, 30 Church street, New York, $24,294; Standard Asphalt & Rubber Company, 115 Broadway, New York, $25,575.

Bids were received as follows, February 17, for regulating, grading and curbing, with all work incidental thereto, Forty-first street, from Sixth avenue, to a point about 320 feet more or less west of Ninth avenue, and laying sidewalks from Sixth avenue to New Utrecht avenue: The Mangeri Company, $7,592; John J. Guinam, $7,997; Chas. Giannattaio & Bro., $8,260; National Cement Construction Company, $8,061; Paladino Construction Company, $7,556.

Rochester, N. Y.—Bids were received for North Goodman street pavement, the lowest being F. V. Brotsch Co., for $39,258. The bids ran up to nearly $49,000; the contract was not awarded.

Syracuse, N. Y.—Bids for the paving of South State street, from Colvin street to Brighton avenue, were opened Feb. 23, but no award was made, owing to the absence of Mayor Fobes from the city. John Young's bid of $21,325 for repairing asphalt pavements during the coming year was a surprise. Last year, for practically the same surface, 18,000 square yards of asphalt surface and the laying of 500 square yards of new pavement, the cost was about $30,000.

Cleveland, O.—The Commissioners of Cuyahoga County have awarded the contract for grading, curbing and paving about 6 miles of roadway to E. A. Freshwater & Sons, for $150,000.

Hamilton, O.—The Board of Public Service, Feb. 24, opened bids for a number of street improvements. Bids for grading, graveling and constructing cement curbs and gutters on Elvin avenue, Gray avenue, North E street, Mason avenue and Rhea avenue were received from the Northwestern Construction Co., of Franklin, Pa.; Dill & Shaffer, of Dayton, O.; W. H. Louthan, J. H. Trunk, William Boaz and the Garver Contracting and Transfer Co. Storm and sanitary sewers are to be constructed in some of the streets. Bids were also received to pave Court street alley and Wood street with sheet asphalt, and the Andrews Asphalt Paving Co. and the Barber Asphalt Paving Co., the latter of Zanesville, submitted bids. Andrews' bill being low. The bids were referred to Engineer Diloin for tabulation.

Bids for sanitary sewers in Hanover and South Fifth streets were also opened.

Oakwood, O.—The Village Council, February 19, awarded the contract for the paving of Brown street to the J. E. Conley Company; the street is to be paved with Bolen block for a distance of six squares, beginning at loop of Oakwood Street Railway Company; the contract amounts to about $15,000.

Toledo, O.—The Andrews Asphalt Paving Company, of Hamilton, has secured the contract for paving with asphalt a portion of Collingwood avenue, at $16,974.

Toledo, O.—Garrigan Bros., Valentine Bldg., have secured the contract to pave with brick portions of Hawley street and Western avenue for $14,688 and $3,576, respectively.

Tippecanoe City, O.—S. K. Robinson & Company were awarded the contract, at $1,402.78, for improving Fourth street.

Youngstown, O.—The following bids were opened Feb. 13 by Good Roads Commissioners of District No. 1, for constructing macadam pavement on 6,100 ft. of Salt Springs Road and 4,800 ft. on Vestal Road: (a) limestone, (b) sandstone, and (c) slag foundation—W. W. Kelly (a), $16,543, (b) $15,021, (c) $13,698; Charles Harris (a) $20,351, (b) $19,000, (c) $19,500; C. A. Gialdini & Co. (a) $15,875, (b) $13,935; Waldeck & Ready (a) $13,591, (b) $13,100, (c) $12,500; T. H. Watson (a) $17,649, (b) $17,210, (c) $16,308, and Kennedy Bros. (a) $14,598, (b) $13,106, and (c) $12,401.

McAlester, Okla.—Contract for street paving was let to McEachin & Enloe, at $7,358.15.—J. M. Gannaway, City Clerk.

Sapulpa, Okla.—The contract for about 3 miles of asphalt paving has been awarded to the J. F. Hill American Asphalt Co., of Chicago, Ill., at $1.87 per sq. yd.—S. N. Hurd, City Clerk.

Portland, Ore.—For the sixth time bids for the improvement of East Third street, between East Oak street and Hawthorne avenue, were considered and rejected by the Street Committee of the City Executive Board, Feb. 18. The Pacific Bridge Co. was the only bidder, but its bid of $72,000 was $3,400 in excess of the estimates of the City Engineer.

East Stark, from East Twentieth to East Forty-fifth street, will be improved immediately, the contract having been awarded to Bechill Bros.

College Hill, Pa.—The contracts for improving College avenue, to consist of about 9,000 sq. yd. vit. brick paving and 2,800 lin. ft. 20 to 36-in. storm sewer, has been awarded to David R. Porter, of Beaver Falls, for $15,261; Pennsylvania clay block will be used; work will start at once.—Carl S. Donaldson, Borough Engineer.

Wilkes-Barre, Pa.—The street paving contract has been let to the Warner-Quinlan Company by the Joint Finance and Street Committee; an estimate presented the committee by City Engineer Finch showed that for a period of one year it cost the city $36,000 to repair and maintain its asphalt streets. For a period of six years this meant an outlay of $216,000. The terms of the Warner-Quinlan Company offered greatly reduced figures, but the contract must be taken for a period of ten years. It is agreed that all asphalt streets in the city will be repaired and maintained for a period of ten years at the rate of $12,500 per annum. At the expiration of the contract the streets are to be left in a good condition.

Greenwood, S. C.—The paving contract has been awarded to Bowe & Page, of Augusta, Ga.; the brick work will embrace approximately 21,333 square yards of pavement. The bids received were as follows: George W. Warring, Columbia, wood block, $46,604; Atlantic Bitulithic Paving Company, Richmond, Va., $46,517; Southern Paving Construction Company, Chattanooga, Tenn., $45,913; Bowe & Page, Augusta, Ga., brick, $45,170; R. Blome Company, Chicago, Ill., $45,064; Wilson, Sampayras & Urquhart, Consulting Engineers; Kenneth Baker, Mayor.

Chattanooga, Tenn.—City has awarded contract to Southern Paving & Construction Co., First National Bank Bldg., at $24,869.70, for paving about 12,000 sq. yd. on East Main street with vitrified brick.—H. T. Van Dusen, Chairman Board of Public Works.

Beaumont, Tex.—Bids for hauling shell for the city were opened by Council as follows: R. S. Farmer, 67½ cents per cubic yard; E. C. Wiess, 65 cents per cubic yard; the bids were referred to the Street and Bridge Committee; in the prosecution of its street improvements the city uses a large amount of shells which are furnished on the bank of the Neches River and it is necessary to have them hauled to the various parts of the city.

Dallas, Tex.—E. Wunderlich bid $741 for the laying of sanitary sewers in Jackson street between Santa Fe and Harwood, the district to be paved; George S. Vivian bid $792; the bids were referred to Commissioners Doran and Sullivan.

On Floyd street, excavation, E. L. Haralson bid 28 cents a cubic yard, and on Oak street 26 cents; for both the bid of A. F. Moberly was 25 cents, if he be allowed to use the dirt; this is for the improvement of Central Square, the city's new park, and it is expected that the city will use the dirt.

El Paso, Tex.—City has awarded contract for laying bitulithic pavement to amount of approximately $185,000.—Percy McGhee, City Clerk.

Norfolk, Va.—Perry W. Ruth has been awarded contract by the Ballentine Realty Company to lay granolithic sidewalks on its property from the Cape Henry to the Ocean View car lines, 1 mile in length, at about $30,000.

Olympia, Wash.—W. A. Weller has secured the contract for paving Main street, between Third and Seventh streets, with brick, about 6,500 square yards, at $19,893.

Seattle, Wash.—The following bids were received, February 13, by the Board of Public Works, for paving Sixth avenue, etc., with (a) sandstone, (b) granite: T. Ryan, Sullivan Block, Seattle, (a) $106,109, (b) $107,963; Sparger Concrete Company, Colman Block, Seattle, (a) $101,830, (b) $104,379; C. W. Cort & Company, Seattle, (a) $105,600, (b) $106,991; Paul Steenstrup, Seattle, (a) $100,748, (b) $102,139 (awarded contract); Coast Construction Company, Pacific Block, Seattle, (a) $102,888, (b) $103,815; C. J. Erickson, 318 Columbia street, Seattle, (a) $109,087, (b) $111,636; Haus Pederson, Alaska Bldg., (a) $111,200, (b) $111,188.

Seattle, Wash.—The Board of Public Works has awarded contract for concrete sidewalks on Eastlake avenue to Nicholas & Jahn at $15,859, and paving Washington street to F. McLellan & Company at $132,341. Paul Stemstrup, Downs Blk., has secured the contract for paving Sixth avenue at the following bid: Fixed estimate, $3,000; clearing and grubbing, lump sum, $500; 4,000 cu. yd. earthwork, 70 cts.; 4,635 sq. yd. granite paving, 5 in. base, $4; 18,150 sq. yd. vit. brick, 5 in base, $2.55; 8,249 lin. ft. straight granite curb, $1.60; 626 lin. ft. curved granite curb, $1.90; 136 lin. ft. granite curb, reset, 40 cts.; 344 sq. yd. brick gutters, $2.70; 330 sq. yd. brick alley crossings, $2.70; 7,698 sq. yd. concrete walks, $1; 15 sq. yd. concrete walks, repair, $1.15; 408 lin. ft. wood stop, 40 cts.; 13 catch basins, single inlet, $65; 4 catch basins, double inlet, $75; 11 manholes and flush tanks, adjusted, $20; 4 inlets, $20; 7 inlets, rebuilt, $15; 250 lin. ft. 8-in. sewer pipe, side connections, $1.50; 770 lin. ft. 6-in. sewer pipe, side connections, $1; 5,000 lin. ft. 3-in. sewer pipe, 15 cts.; 200 lin. ft. 3-in. tile drain, 15 cts.; 574 lin. ft. 16-in. c.-i. pipe, class A, $3.40; 918 lin. ft. 12-in. c.-i. pipe, class A, $2.20; 854 lin. ft. 8-in. c.-i. pipe, class A, $1.35; 1,470 lin. ft. 6-in. c.-i. pipe, class A, $1.10; 800 lb. special castings, 7 cts.; 84 lin. ft. 8-in. c.-i. pipe, $1.40; 72 lin. ft. 6-in. c.-i. pipe, $1.15; total, $102,138. Totals of other bids received: T. Ryan, Sullivan Bldg., $107,963; Sparger Concrete Co., Colman Blk., $104,379; C. W. Coit & Co., Seattle, $106,991; Coast Concrete Co., Pacific Blk., $103,139; C. J. Erickson, 318 Columbia street, $111,636; Hans Pederson, Alaska Bldg., $111,188.

Seattle, Wash.—W. R. Crawford, of the Seattle, Renton & Southern, announces that he has awarded contract for paving that portion of Fourth avenue required by his franchise to McAdam & Co., and work is to begin at once. The contract carries a penalty clause which requires the completion of the work by June 1. The end of the line for the present will be at Third avenue and Pine street. A permit has been applied for to lay rails on Pine street, and Crawford says work will begin there as soon as it is issued.

Spokane, Wash.—Eight contracts for city improvements, including two sewer contracts, estimated by the Engineer's office to cost $54,191, were let, February 18, for $46,941. Eighteen bidders were in the field for the work, one of the longest lines ever assembled at the City Hall for work of this kind.

Grade, curb and sidewalk, Lee street, Boone avenue to Colorado avenue: Estimate, $6,600; C. M. Payne, $5,712; Mitchell Brothers, $6,200; Massie Brothers & Long, $6,260; Abbott & Joslin, $6,600.

Grade, curb and sidewalk, Lower crossing and Falls avenue, Summit boulevard to Spring avenue: Estimate, $3,700; Foster & Hindle, $3,745; Mitchell Brothers, $3,965.

Paving, Sixth avenue, Stevens street to Bernard street: Estimate, $11,000; Western Asphalt Paving Company, $8,997, 10 years' maintenance, $889.70; Barber Asphalt Paving Company, $9,500; 10 years' maintenance, $950; Independent Asphalt Paving Company, $10,000; 10 years' maintenance, $1,000.

Grade, curb and sidewalk, Sixth avenue, Magnolia street to Regal street: Estimate, $12,450; C. M. Payne, $10,698; Foster & Hindle, $12,746; A. B. Hogan, $12,284; John Fife, $12,844; L. B. Handley, $11,977; Mitchell Brothers, $11,600.

Grade, curb and sidewalk, Spofford avenue, Washington street to Calispell street: Estimate, $1,600; Massie Brothers & Long, $1,480; Foster & Hindle, $1,800; Mitchell Brothers, $1,598; Abbott & Joslin, $1,522.

Sidewalk, Sprague avenue, Hilliard street to trestle: Estimate, $6,500; Mitchell Brothers, $6,400; Foster & Hindle, $6,450.

Waukesha, Wis.—A contract has been awarded to Marguerite Construction Co., 171 Washington street, Chicago, Ill., for street paving as follows: For 10,702.7 cubic yards excavation, $3,745.95; 18,765.9 linear feet combination curb and gutter, $9,570.61;

24 linear feet foot bridges, $38.40; 132 linear feet concrete drains, $330; 26,265 square yards macadam, $17,597.55; 19 catchbasins, $570; 2 manholes, $50; 500 linear feet storm sewer, $300. The total full bids were: F. C. Froemming, Milwaukee, Wis., erregular; John Striffler, Springfield, Ill., $35,418.27; Froemming, Milwaukee, Wis., irregular; Inter Ocean Paving and Construction Company, 108 Dearborn street, Chicago, Ill., $34,150.81; J. Rasmussen & Sons Co., Oshkosh, Wis., $36,423.58; A. C. Rutledge & Company, Rockford, Ill., $35,898.22; D. A. Thatcher, 411 Chamber of Commerce, Chicago, Ill., $39,057.37; Eul, Chockems & Nebel, Sturgeon Bay, Wis., $33,913.47; Advance Construction Company, Waukesha, Wis., $34,651.53; John O. Jones, Racine, Wis., $37,474.48; J. A. Campbell, 953 Rookery, Chicago, Ill., $37,253.41; F. Boortz, Waukesha, Wis., $40,331.80; Marquette Construction Company, 171 Washington street, Chicago, Ill., $32,202.51.

SEWERAGE

Birmingham, Ala.—Bids for sewers aggregating $200,000, received February 3, details of which were given in February 17 issue, were rejected by the City Council; the new letting will take place about April 7.—Maury Nicholson, City Engineer.

Graymont, Ala.—Citizens have voted $10,000 bonds for extending sanitary sewer system about 7,000 feet.—Milner & Browne, Birmingham, Engineers.

Phoenix, Ariz.—A committee composed of E. J. Bennitt, H. J. McClung, Dwight B. Heard, Joseph Thalheimer, P. T. Hurley and Roy Goodrich is considering the sewer question; Committee has received very material help from time to time from Engineers Howard Reed, L. G. Knipe, O. A. Turney, W. A. Farish and from Mayor Coggins, J. C. Adams, Judge Ainsworth and J. L. B. Alexander. Mr. Knipe has presented to the Committee a carefully prepared estimate of the cost of duplicating such a plant as the city now has and a similar estimate of a new system to cover a large part of the city and to cost approximately $300,000.

Camden, Ark.—City is considering the construction of a sewer system in western part of city, creating sewer District No. 4.—E. H. Carson, Mayor.

Prescott, Ark.—City is considering construction of a sewerage system.—J. A. Bailey, County Clerk.

Mayfield, Cal.—The Board of Trustees has decided that a sewer bond election will be held on April 5, despite the fact that the electors refused to open the polls on Feb. 15.

San Bernardino, Cal.—Council has received resolution ordering the construction of a sewer in the Mt. Vernon district.

San Bernardino, Cal.—Petitions are being circulated for the extension of sewers up D and E street.

Tulare, Cal.—Council is considering the construction of a sewerage system; cost, $48,000.

Julesburg, Col.—C. H. Meeker, of McCook, Neb., is preparing plans for a system of sewers; estimated cost, $30,000; contract will be let in March.

Hartford, Conn.—The report of City Engineer Ford on the east side flood protection question is a continuation of the first installment of the complete report, which installment was submitted some months ago; second installment does not finish the report, but it was accepted as a report of progress and a resolution recommending an appropriation of $300,000 for an intercepting sewer in the east side was referred to the Board of Finance; as the City Engineer desires to consider the drainage of Colt meadow and the treatment of sewage in the Franklin avenue district as integral parts of the east side flood protection question, he will take time to develop these phases of the report further.

Washington, D. C.—Engineer Commissioner Cosby has ordered the construction of a new section of the trunk sewer in Sixth street, N. W., at a cost of $24,000; also a service sewer in Spring road and 345 feet of 8-inch water main in Eleventh street.

Athens, Ga.—Council has ordered the construction af a sewer on Church street.

Dublin, Ga.—Sewer system will be extended.

Jesup, Ga.—Bonds will be issued for the installation of sewerage system.

Bridgeport, Ill.—J. C. Spiker, a Civil Engineer from Vincennes, is making a survey of the town for a sanitary sewer and to pave Main street north to intersection of the public road; also Chestnut street.

Burnham, Ill.—Village will construct a waterworks and sewerage system; cost, $12,000.—J. Wyland, President Board of Public Improvements. F. J. Cullman, Burnham.

Chicago, Ill.—The Engineering Committee of the Drainage Board is considering plans for the building of an experimental sewage disposal plant at Ninety-second street and the Calumet River; cost, $15,000—I. J. Bryan, Secretary Board of Trustees.

Freeport, Ill.—The Board of Local Improvement is considering ahe construction of a sewer system in West Freeport.

Newton, Ill.—Plans and specifications for sewers are being prepared by Lee L. Harper, C.E., Belleville.

Springfield, Ill.—Council is considering the construction of a sewer in the south end of city on Laurel and Fifteenth streets; cost $13,460.

Princeton, Ind.—Council is again considering sanitary sewerage question; plans were drawn two years ago by E. E. Watts, Civil Engineer; cost, $70,000.

Mt. Sterling, Ky.—Mayor C. W. Harris has appointed W. C. Hamilton Chairman of a Committee to secure plans for a sewerage system.

Crookston, Minn.—All bids have been rejected for constructing a sewerage system in Alexander street, River avenue and Summit avenue; cost, $5,300 new bids will be received in June.—A. M. Childs, City Clerk; J. E. Carroll, City Engineer.

Minneapolis, Minn.—City may be compelled to abandon her present system of draining sewers into the Mississippi and put in a more modern method of municipal sanitation.

Carterville, Mo.—City will receive bids after the April election for district sewers for the city.—H. E. Moody, City Clerk; Frank Funk, City Engineer.

Carthage, Mo.—Plans are being prepared by City Engineer F. B. Newton for vitrified pipe lateral sewers; cost, $2,000.—I. F. Shannon, City Clerk.

Joplin, Mo.—Engineers Burns & McDonnell, Scarritt, Bldg., Kansas City, Mo., and City Engineer J. B. Hodgdon, have prepared plans for brick storm and sanitary sewers; estimated cost, $96,000.—Hiram Phillips, City Clerk.

Kansas City, Mo.—Former City Engineer Edgar A. Harper has recommended an issue of sufficient bonds to construct an entirely new system to dispose of sewage by means of septic tanks; plans for a new system include separate systems to carry storm water and house sewage; the location of the septic tanks at the least objectionable points on each sewer line, and the establishment of filter beds for the final purification of sewage near the Missouri River.

Chadron, Neb.—Plans have been prepared for the construction of a sewerage system.

Audubon, N. J.—A sewage plant for the borough of Audubon is the latest demand made by the people of the town; accordingly, the borough engineer has been asked to submit an estimate for the proposed plant; will cost at least $60,000.

Camden, N. J.—The State Board of Health has again issued an order for a sewage disposal plant and the city must now build.

Newark, N. J.—Favorable action has been taken by the Committeee on Finance of the Common Council on the plan of the Board of Works, embodied in a bill recently introduced in the Legislature, to have the city of Newark advance an additional sum of $50,000 to further the preliminary work of constructing the proposed Passaic Valley trunk sewer.

Newark, N. J.—The Board of Public Works has ordered sewers built in Warwick, Shipman, Fourth and Prospect streets; with the exception of the Warwick street drain, which is to be a 10-inch pipe, the flumes will measure 12 inches in diameter.

Ocean Grove, N. J.—Clyde Potts, 17 Battery Place, New York, N. Y., has been selected to design sewage disposal works.—A. E. Ballard, President.

Trenton, N. J.—Council has ordered sewers constructed in Adeline Street and Garfield Avenue.

Brooklyn, N. Y.—Bids will be received March 3 for furnishing material and constructing sewers in portions of Avenue I, Sixth and Eighteenth avenues; 3,150 linear feet 24, 18, 15 and 12-inch pipe sewers and 3,300 feet sheeting and bracing, etc., will be needed.—Bird S. Coler, Borough President.

Buffalo, N. Y.—Citizens are urging the construction of a sewer in William street.

Kinston, N. C.—Citizens are considering a $75,000 bond issue for extension of sewer system.

Cincinnati, O.—A resolution has been passed for constructing a sewer in Schott street, from the sewer in Harrison avenue.

Dayton, O.—Clerk Budroe, of the Servers, has been authorized to advertise for bids on the construction of a sanitary sewer; sewer will be installed east of St. Paul avenue and Parrott street and south of Newcomb street.

Hamilton, O.—The City Civil Engineer has submitted plans and specifications for various storm sewers in the low-lying districts in the Second Ward, the estimated cost being $7,305.50, and for a storm sewer on East Avenue from Sycamore Street to Grand Boulevard, the estimated cost being $9,492.35.

Vermilion, O.—Nichols & Muehlberg have about finished a map for the complete sewer system which will be undertaken at a very near date; plans and specifications are to be used to arrive at an estimate of the total cost, which is also to include a sewage disposal plant; there has never been a sewer system of any kind in Vermilion and the job will be a big undertaking for the village.

Warren, O.—Bids will be received about March 15 for 900 feet of 9-inch vitrified tile sewer.—Z. F. Craber, President Board of Public Service; B. C. Smith, City Engineer.

Youngstown, O.—The George Tod Cemetery Association has selected Smith & Turner, Consulting Engineers, to prepare plans and specifications for a sewerage system.—H. H. Stambaugh, Trustee.

Ardmore, Okla.—Citizens will vote March 23 on $80,000 sewer bonds.

Chandler, Okla.—Burnes & McDonnell, Kansas City, Mo., have prepared plans for construction of sewer system.

Holdenville, Okla.—Citizens have voted $110,000 bonds for the installation of a sewer system, extension of the water works and the erection of a City Hall.

Nowata, Okla.—Citizens have voted a bond issue for the construction of a sewerage system.

Altoona, Pa.—Mayor S. M. Hoyer has signed ordinances for 8-inch sewers in Eighth alley, Twenty-first avenue and Sixteenth street.

Chester, Pa.—Council has passed an ordinance for the construction of an 18-inch terra-cotta pipe sewer on Fifteenth street.—William T. Cullis, City Clerk.

Erie, Pa.—City will be compelled to find something like $400,000 to take the sewage out of the bay, if the ideas of the State Board of Health are persisted in, and will be compelled to maintain besides an expensive pumping plant to convey the sewage to the locality where the State Board of Health is of the opinion the disposal plant should be situated; City Engineer B. E. Briggs has returned from Harrisburg, where he had a long conference with F. H. Snow, Chief Engineer for the State Board of Health; idea of Engineer Snow, from observations of the locality and the conditions here, is that the disposal plant should be located on the peninsula, the State declining to permit the use of the many acres which would be necessary of the Soldiers' Home land to be used for the purpose; if this idea is adhered to, it will necessitate the construction of a submarine sewer 8,000 feet in length across the bay, and it would involve a condition which presents opportunity for damage and destruction to the sewer continually.

Narragansett, R. I.—Call has been issued for a special financial town meeting to consider the sewer question; in addition to the proposition to rescind the vote passed last August, by which an expenditure of $30,000 was authorized to change the sewerage system by constructing septic tanks, the call also provides that action may be taken to make an appropriation to repair the present sewer outlets.

Providence, R. I.—Plans are about finished for the construction of a main trunk sewer for the annexed district; cost $200,000.—Walter F. Slade, Commissioner of Public Works.

Dallas, Tex.—On recommendation of Commissioner Sullivan, the construction of a six-inch sanitary sewer on Throckmorton Street, from Cedar Springs to Knight, at a cost of not to exceed $485.50, and on Cedar Springs, from Knight to Throckmorton, at not to exceed $393, has been ordered.

Richmond, Va.—Estimate of cost will be prepared for the construction of new sewers in the Clay Ward and other parts of city, including a trunk sewer through the Dooley property.—C. E. Bolling, City Engineer.

Winchester, W. Va.—Engineer N. Wilson Davis and a number of assistants are making working plans and specifications for the new Winchester sewerage system, the installation of which was recently authorized at a special election; it is expected that the work will begin in the early spring and the improvements will cost about $50,000.

Sparta, Wis.—City is considering the laying of 4,279 feet of 6-inch sewers and 1,075 feet of 8-inch sewers, with eight manholes.—H. Teasdale, President Water Committee.

Toronto, Ont., Can.—Council has selected Rudolph Hering, 170 Broadway, New York, and John D. Watson, of Birmingham, England, to report upon the sewage disposal system for Toronto.—C. H. Rust, City Engineer.

Winnipeg, Man., Can.—City Engineer Ruttan has estimated the cost of constructing sewers, as follows: Combined intercepting sewers from Colony and Assiniboine avenues to Red River north of

city, including Cornish street system, $1,225,000, or storm sewers in same section for dry weather flow only, $400,000; for combined intercepting sewers from Assiniboine River at Clifton street to Red River north of city, including capacity of that portion of Ward 1, west of Cambridge street, $3,077,080; sanitary sewers for same section for dry weather flow only, $750,000.

Yorkton, Sask., Can.—The Water & Sewer Commissioner has recommended the extension of the sewerage system and water works; cost, $50,000; also the sinking of a new supply well; cost, $1,800.

Culican, Mex.—Plans for remodeling sewer and drainage systems have been prepared by Consulting Engineers Olmsted & Gillelen, 607 Wright & Callender Building., Los Angeles, Cal.

BIDS RECEIVED AND CONTRACTS AWARDED

Santa Cruz, Cal.—Wolf & Anthony have been awarded a contract for furnishing and laying 16¼ miles of 6-inch, 8-inch, 10-inch and 12-inch round pipe sewers at an average depth of 5 feet in hard pan and loam soil for 32 cents for 6-inch, 40¼ cents for 8-inch, 54¾ cents for 10-inch and 77¼ cents for 12-inch; manholes, $29.36; wages, common labor, $2. Mean of bids of successful bidder, 51 cents; mean full bids, 68½ cents. Other bids were: Contra Costa Construction Company, $74,000; Mahoney Bros., $65,802.10; J. H. O'Brien, $65,000; J. C. Pratchner, $64,000; Whitney Bros., $55,151.67; Dunleavy & Lynch, $57,274.80; Wm. Heafey, $53,555.05; C. D. Vincient, $56,991.75; T. B. Downing, $56,880.88; Wolf & Anthony (accepted), $45,979.28.

Albany, Ga.—The Special Surface Drainage Committee of Council has let the contract for the larger sizes of pipe to be used in the city's new drainage system to the Reinforced Concrete Pipe Company, of Jackson, Mich., for about $8,000; the contract is for about three-quarters of a mile of reinforced concrete pipe.

East St. Louis, Ill.—The Board of Public Improvements has let the contract for the construction of the outlet sewes system to O. T. Dunlap, of Edwardsville; he was the lowest bidder, his figure being $710,266.65; he is allowed ten days in which to give a bond for $250,000, and the sewer must be completed in two years; details of all bids received were given last week.

Indianapolis, Ind.—The Board of Public Works has accepted bid for sewer in alley west of Arsenal avenue, from Michigan to Vermont, Reliable Construction Company, $1.38½, and for sewer in Nelson street and alley east of Nelson street, from Pleasant run to first alley south of Lexington, Joseph Davis & Company, $1.23.

Independence, Kan.—Council received a number of bids for sewer intersection at L. T. and South Fourth street and the American Concrete Company got the job for $894.58, the lowest bid.

Bids for the North Side sewer were opened as follows: C. C. Michal, $2,172.07; American Concrete Company, $2,449.03; M. F. Wood, $2,115.62; Rushmore & Gowdy, $1,946.60; F. Dellone, $1,982.05; the Engineer's estimate on this work was $1,999.05 and Rushmore & Gowdy were given the contract at a figure slightly under the estimate.

Leavenworth, Kan.—Two contracts were let, February 18, for the Federal prison by C. K. Macey, Chief Clerk of the Penitentiary for sewer piping for the prison grounds. Crane & Company, of Kansas City, were awarded the contract for furnishing 950 feet of soil sewer pipe 4, 5, 6 and 8 inches in diameter and for 150 pieces of joints and ties, 1,000 pounds of pig lead and two bales of oakum, for $383.27. Evans & Howard Fire Brick Company were awarded the contract for 1,650 feet of clay pipe and fittings for $155.35.

Louisville, Ky.—Carpe & Gray, city, have been awarded the contract by the Sewerage Commissioners for the construction of the St. Xavier street sewer.

Natchitoches, La.—The Police Jury Committee—P. E. Prudhomme and C. E. Preley—opened bids for installing a sewerage system for the jail and court house and conveying same to the river, and awarded the contract to E. L. Dezendorf, of this city, for $801.75; there were only two bids, the other being by the Hoke Plumbing and Heating Co., of Shreveport, for $1,790. The contractor is to furnish all material.

Boston, Mass.—Superintendent of Streets Guy C. Emerson has awarded contracts for cleaning catch basins at prices ranging from 85 cents to $1.38 a cubic yard.

Detroit, Mich.—Council has awarded contract to Ferd. Porath, Jr., Michigan avenue and P. M. R. R., for Section 5, Waterman avenue public sewer, at $14,272.02.

Minneapolis, Minn.—Bids were received as follows by Council for sewer supplies: For 2,000,000 sewer brick: Wisconsin Red Pressed Brick Company, city, $9.25 per M; Minneapolis Brick & Tile Company, city, $9; Menomonie Hydraulic Pressed Brick Company, city, $9.10. 200 tons of special castings: Crown Iron Works, city, $36 per ton; Northwestern Foundry Company, city, $30; Menzel & Jeffery Company, city, $40; Diamond Iron Works Company, city, $29; North Star Foundry Company, city, $33; Standard Foundry Company, city, $32. —Andrew Rinker, City Engineer.

Minneapolis, Minn.—Although its bid was $300 higher, the Red Wing Sewer Pipe Company was awarded the contract for furnishing the 1909 supply of sewer pipe by the Sewer Committee of the Council. The amount of the bid was $38,677.

The committee acted upon the advice of Andrew Rinker, City Engineer, who preferred the Red Wing product, as it has been used for years.

The Minneapolis Brick & Tile Company and the Wisconsin Red Pressed Brick Company were awarded contracts for supplying 2,000,000 sewer brick at $9 per 1,000.

The Northwestern Lime Company will furnish Portland cement at $1.15 a barrel. Landers, Morrison & Christenson will furnish all natural cement, and the Diamond Iron Works all special castings, being the lowest bidders.

Detroit, Minn.—Pastoret & Lawrence, of Duluth, have secured contract for constructing the sewerage system, for $31,331.

Springfield, Mo.—John Spondri, city, was awarded the contract for constructing vitrified pipe sewers in sewer district No. 12; cost, $12,000.—G. W. Hackney, City Clerk; H. G. Horton, City Engineer.

Auburn, N. Y.—The Board of Estimate and Control awarded contract to Jerry Corkery, city, for the construction of a tile sewer in Benham avenue.

Buffalo, N. Y.—Bids were opened, February 18, by the Department of Public Works for the construction of sewers in three different parts of the city. The sewers are to be constructed in Angle, Tyler and Flaiver streets, and the bids were as follows: B. F. Spire, $14,789; W. G. Smith, $13,900; William Franklin, $13,800; Dark & Company, $14,359; William Rappick and W. C. Colliton, $19,150; Fred J. Munn, $15,998; H. P. Burgard, $16,800; G. C. Waite, $12,498; John Miller, $18,327.

Rochester, N. Y.—The Board of Contract and Supply let the contract for Goodman street sewer and walks to J. Friedrich & Co., for $2,148.25, and for Boss place sewer to John Petrossi, for $467.25.

Fremont, O.—Frank B. Myers was awarded contract for constructing 3,628 feet of 10 and 12-inch tile sewers on the Charles Darr and Andrew Rimelspach farms, in Ballville Township.

Hamilton, O.—The County Commissioners, February 20, awarded the contract for the closed section of Crawford's Run ditch to the Hall-Cronin Company, of Dayton, at their bid of $50,450; three other firms bid: Thomas Strock, of Cincinnati, $50,708.10; the Ganer Construction Company, Hamilton, $50,550, and William Boaz, Hamilton, $50,500. The work was let about six months ago to J. W. Guilliame, of Butler County, at $1,200 over the lowest bidder, but the contract was tied up by an injunction and the Commissioners decided to readvertise for bids; work will commence at once.

Portsmouth, O.—Samuel Monroe & Son were low bidders for constructing the Kehoe alley sewer, between Third and Fourth streets.

College Hill, Pa.—Council, February 19, opened bids on sewering and paving College avenue from Twenty-sixth to Thirty-second street. There were 15 bids, the lowest being that of F. H. Partington and D. R. Porter, which was $15,261, and specified Pennsylvania clay bricks and blocks. Partington & Porter's bid was the lowest on all materials; contract will be awarded the firm.

Spokane, Wash.—The Board of Public Works has awarded contract for Fifth Ward sewer to Foster & Hindle. Bids were received as follows:

Fifth Ward sewer, district No. 3: Estimate, $10,208; Foster & Hindle, $9,298; James C. Broad, $9,965; G. Burgie, $12,600; John Fife, $10,144; P. L. Langan, $9,452; Lang & Smith, $9,770; Thomas Malony, $9,664; Naylor & Norlen, $9,777.77.

Sewer, Sixth avenue, Maple street to 25 feet east of west line of Adams street: Estimate, $2,133; P. L. Langan, $1,731; J. C. Broad, $1,965; Foster & Hindle, $2,064; G. Burgie, $2,000; W. T. Garboden, $1,960; John Fife, $2,344; Lang & Smith, $2,090; Thomas Malony, $1,882.

WATER SUPPLY

Florence, Ala.—City will soon receive bids on about 852 feet storm sewer 21-inch clay pipe.—L. O. Scruggs, City Engineer.

Montgomery, Ala.—The Building Committee has authorized Dr. C. C. Thach, President Alabama Polytechnic Institute, to extend the college water works system into the town of Auburn.

Opelika, Ala.—City is considering installation of water and lighting.—W. C. Robinson, City Clerk.

Los Angeles, Cal.—City will construct reservoir on the top of McKinley hill, in Elysian Park, to provide for the proper irrigation of trees in the higher sections of the park.

Oakland, Cal.—On recommendation of the Auditing and Finance Committee Council has passed to print an ordinance providing for the installation of the pipe system for the salt water plant under course of construction at the Willows and appropriating the sum of $54,500 for the purchase and laying of mains and connections; it is to cover a total of 60 blocks between Sixth and Fifteenth streets east of Jefferson street, 500 tons of pipe in all to be used; two pumps are first to be installed on Lake Merritt but a third pump will be added to the plant at a later date and the pipe system extended to other sections of the city; with the third pump the power of the plant will be materially increased.

Sacramento, Cal.—The Water Committee of the Board of City Trustees will recommend that the city employ an expert on filtration to work with City Engineer G. N. Randle.

Fowler, Col.—City will expend from $10,000 to $15,000 for water works improvements.—G. H. Sethman, Engineer, of Denver; A. S. Marshall, City Secretary.

Montrose, Col.—Robert McF. Doble, Majestic Building, Denver, is making location surveys for a flume and canal for the purpose of supplying San Miguel River water to the mesa lands in the vicinity of Coventry, Shenandoah, and East Paradox Valley; specifications on which bids will be invited will be ready in about two months.

Shelton, Conn.—The Shelton Water Company is considering the laying of mains through Fairfield Avenue.

Washington, D. C.—An American consul in a Canadian city has forwarded copy of a call for tenders for the installation of a pumping plant for the municipal water works. These works are owned and operated by the corporation of the city, and all tenders for the proposed works must be in the hands of the City Engineer on or before March 1, 1909. Full particulars and copy of the call can be obtained by interested firms from the Bureau of Manufactures.—Address No. 3103.

Leesburg, Fla.—The construction of water works is being considered.

Pensacola, Fla.—Robert L. Graveley, Box 344, is considering the purchase of gasoline and electric pumps, cast iron pipe, tanks and fittings, for 10,000-gallon plant.

Athens, Ga.—Council has ordered the construction of a 6-inch water main on Bloomfield street.

Colquitt, Ga.—City has selected J. B. McCrary & Son, Atlanta, Ga., as Engineers for improvements to water works.—L. E. Calhoun, Mayor.

Montezuma, Ga.—A water tank will be constructed.

Moultrie, Ga.—Citizens will vote on $50,000 bond issue to extend water mains, complete sewer work and improve streets.

Vidalia, Ga.—Citizens will soon vote on $9,000 bonds for improving the water works and electric light plant.

East St. Louis, Ill.—Council has passed an ordinance authorizing the City Water Company to place 6-inch water mains and to place a suitable number of fire hydrants on Brady avenue, on Twenty-seventh street and on Eighteenth street.

Joliet, Ill.—City is considering the installation of a high-pressure system for better protection in the business district; City Engineer Stevens is preparing plans.

Pekin, Ill.—Council has been petitioned by Lucas & Weise, of Pekin, for a franchise for water works.

Waukegan, Ill.—Bids will be received at once for the construction and installation of a 6,000,000-gallon Corliss cross compound high duty crank and flywheel pumping engine for the water works; cost, about $20,000.—Alderman Hart, Chairman Water Works Committee.

Shirley, Ind.—Citizens have voted to issue bonds for the construction of water works.—G. C. Wallace, Anderson, Ind., Engineer; Adam Durham, Town Clerk.

Perry, Ia.—City will rebuild the water works at a cost of $15,000.—Adrian Cross, City Clerk.

Cawker City, Kan.—Citizens of this town are talking seriously of voting bonds this spring for a system of water works; scheme is also under way for the city to buy the electric light plant and run it in connection with the proposed water works system.

Halstead, Kan.—Citizens are considering the construction of a complete system of water works.

Marion, Kan.—Citizens have voted $60,000 bonds for the construction of water works and an electric light plant.

Osage City, Kan.—Plans are being pre-

pared by Engineers Earl & Green, Muskogee, Okla., for a system of water works.

Topeka, Kan.—Superintendent Shaw, of the City Water Works, has sent in his estimates for the construction of a high-pressure system; cost at least $120,000; this does not include the electrical pump that would have to be used at the Harrison street plant and only takes into consideration the main cost of running the pipe line; approximate estimate cost for labor and material to construct this pipe line would be $81,427.59; to equip the Harrison street plant would be $6,501.49.

Madisonville, Ky.—City will grant franchise for water works.—I. N. Vickers, Mayor.

Tallulah, La.—Citizens are urging the construction of a $15,000 system of water works.

Berlin, Md.—Specifications for the installation of a complete water and electric light plant can be obtained from Mayor Orlando Harrison.

Takoma Park, Md.—Council has decided to install water meters, but the work will be done gradually.—B. C. Davis, Clerk.

Williamsport, Md.—City is considering the construction of storage cisterns for Fire Department.

Falmouth, Mass.—The question of extending the water system to North Falmouth and Megansett has been referred to the Water Commissioners to investigate and report the feasibility of the scheme at the next annual Town Meeting.

Gloucester, Mass.—A petition has been received from George O. Stacy and others requesting that the water main be extended on East Main street from the Harbor View Hotel to the Gate Lodge.

Ipswich, Mass.—City will enlarge the reservoir capacity and otherwise improve the water works system.

Coleman, Mich.—Village is considering the construction of water works system; cost, $15,000.—J. J. Wernette, 441 Houseman Building, Grand Rapids, Mich., Engineer.

Otsego, Mich.—Citizens will vote, March 8, on $10,000 bonds to improve the water works system.

St. Paul, Minn.—City Engineer L. W. Rundlett has recommended water works improvements outside city, including improvement of west arm of Vadniss Lake, for additional storage capacity and to improve quality of water; total cost, $75,000.

Virginia, Minn.—The Virginia Light & Water Company has decided to make improvements this summer, including the sinking of a shaft for water purposes; $75,000 will be expended.—J. A. Kennedy, Superintendent.

Laurel, Miss.—City will issue $10,000 bonds for extension of the water works system.

Braymer, Mo.—Citizens are considering the construction of water works.

California, Mo.—Citizens have voted a $30,000 bond issue for the construction of water works.

Marceline, Mo.—City has selected George W. Sturtevant, 1208 Fisher Bldg., Chicago, Ill., as Consulting Engineer for water works.

Arapahoe, Neb.—Citizens have defeated proposition to issue bonds for water works.—E. C. Wagner, City Clerk.

Kearney, Neb.—Bids will be received for the construction of water works as soon as bonds are sold; cost, $100,000.—C. A. Edwards, Engineer; G. E. Ford, City Clerk.

Kimball, Neb.—Citizens have voted $16,000 bonds for water works.

Omaha, Neb.—City will vote on $6,500,000 bonds with which to buy the water works plant.

Fallon, Nev.—Bids will be received about June 1 for the construction of water works; cost, $50,000; bids for bonds will be received about May 1.—E. P. Osgood, of Fallon, Engineer; C. L. Noble, City Clerk.

New Hampton, N. H.—Legislature has granted permission to construct water works.

Whitefield, N. H.—Legislature has granted the right to extend the water system.

Branchville, N. J.—Town will soon ask bids for a water works system; cost, about $40,000.—W. E. Sexton, Engineer, 46 N. 12th Street, Philadelphia.

Stone Harbor, N. J.—The South Jersey Realty Company will erect a one-story pumping plant.—Johnson Hughes, Roxborough, Philadelphia, Engineer.

Washington, N. J.—Council is considering the calling of an election on the question of constructing water works; preliminary plans are now being prepared.—A. J. Craft, City Clerk.

Black River, N. Y.—Citizens will vote on question of a better water supply for fire protection.

Croghan, N. Y.—S. S. Snell, C.E., Lowville, N. Y., is preparing plans for a water works system for the village which will include 2,000,000-gallon reservoir, 23 fire hydrants, cast-iron piping, etc.; gravity fall of 237 feet; approximate cost, $30,000; bids will be called for in spring by the Village Board of Trustees.

Islip, L. I., N. Y.—Citizens are considering municipal ownership of the water works.

Niagara Falls, N. Y.—Detailed plans for the construction and equipment of the new water works system and filtration plant are under preparation by City Engineer W. D. Robbins, and Consulting Engineer Walter McCulloch; bids will be received about April 1.

Potsdam, N. Y.—The State Water Supply Commission has recommended the building of large reservoirs for water storage and flood prevention on the upper Hudson, Genesee and Raquette rivers.

Rochester, N. Y.—The National Board of Underwriters have recommended that the city adopt 8-inch as the minimum size for all future installations of mains; all new mains in the Holly system to be 12 inches diameter or larger; normal pressure in system to be increased to maintain a 90-pound pressure at pumping station; within limits of congested-valve district hydrants of system having less than 6-inch barrel and 6-inch connection to main be replaced by others designed to withstand a working pressure of at least 200 pounds, and having not less than 8-inch barrel, 8-inch grated connection to main and at least four 2½-inch outlets, each provided with independent gate.

Rochester, N. Y.—The Board of Control has rejected unopened all bids for supply meters for 1909; Secretary Pifer has been directed to readvertise, and bids will be received this week.

Roosevelt, L. I., N. Y.—The local Water, Light and Power Company has purchased a site for a pumping station.

Webster, N. Y.—Village has awarded $32,000 water works bonds to Edward Seymour & Co., of New York; specifications have been prepared for water works system.—H. C. Bergh, President Borough.

Murphy, N. C.—Bids will be received in about a month for the construction of water works; cost, $40,000.—J. B. Rider, Engineer.

Waynesville, N. C.—City will expend $25,000 on improving water system.—J. L. Ludlow, Winston-Salem, N. C., Engineer.

Bowman, N. D.—Citizens are considering the construction of water works and fire protection.

East Liverpool, O.—Two ways remain for Council to raise the extra cash necessary for the construction of the mechanical filtration plant; changes in the plans ordered by the State Board of Health will make the cost of the plant several thousand dollars in excess of the amount first estimated; as only $40,000 in cash has been appropriated more funds will have to be raised if the filtration plant is to be constructed this year; Council can either issue bonds to the amount of 1 per cent. of the total tax valuation of the city or else order the Service Board to issue a certificate of indebtedness for the additional cost of the same to be paid out of the water works receipts.

Hamilton, O.—Bids will be received March 19, noon, for $10,000 worth of water works bonds.—H. A. Gummer, City Auditor.

Huron, O.—City has selected a site on the East Side for the proposed water works system.

Lancaster, O.—City will purchase a condensing pumping engine; cost, $5,000.

Toledo, O.—Fire Chief Mayo has recommended the laying of auxiliary mains in the business district.

Toledo, O.—Plans are being prepared for the proposed high pressure fire mains.—F. I. Consaul, Chief Engineer.

Ardmore, Okla.—City will vote March 23 on $75,000 water works bonds.

Holdenville, Okla.—Citizens have voted $110,000 bonds for the extension of the water works, installation of a sewer system and the erection of a City Hall.

Coalgate, Okla.—Citizens are considering a $25,000 bond issue for extension of water works.—D. D. Brunson, Mayor.

Hugo, Okla.—Citizens have decided to construct a pipe line to the Kiomatic River for the purpose of supplying the town with water; it is nearly six miles to the river, and it is estimated that the cost will be $8,000 per mile.

Kiowa, Okla.—City has selected the Michel Cook Engineering Company, Frisco Bldg., Joplin, Mo., to prepare plans for a system of water works; cost, $38,000.—H. G. Hancock, President Board of Trustees; R. M. McDaniel, Clerk.

Shattuck, Okla.—Citizens have voted $50,000 bonds for construction of water works.—O'Neil Engineering Company, Dallas, Tex., Engineers in Charge.

Marshfield, Ore.—City is considering plans for the installation of salt water fire protection system.

Bethlehem, Pa.—Council has passed first reading an ordinance providing for the issue of bonds to the amount of $175,000 for the building of a water plant and the laying of water mains, as sanctioned by the electors of the borough.

Ridgeway, Pa.—Citizens have voted $8,500 bonds for improving and extending the water system.—F. W. Ward, Ridgeway, Engineer; G. Greiner, Secretary Town Council.

Woonsocket, R. I.—Superintendent Ballou has recommended that a site be secured for a new tank.

Hartsville, S. C.—W. E. Scarboro will purchase 125 meter boxes; cast iron; both meter and curb valve.

Chattanooga, Tenn.—A taxing district will be formed on Mission Ridge; should a standpipe be erected it will be located a little below the Bragg tower at the highest point and a water plant may be erected; total cost is limited to $30,000.—J. H. Allison, R. P. Woodward and H. S. Holmes, Commissioners.

Cleveland, Tenn.—The Election Commissioners of Bradley County have called a special election to be held March 20 for the ratification or rejection of the city issuing $60,000 bonds to purchase the Cleveland water works plant.

Knoxville, Tenn.—The Special Water Committee of the Council has been instructed by Council to secure the services of an expert engineer in regard to a solution of the water question; this special committee and the regular Finance Committee have also been authorized to take steps at once to sell the $750,000 water works bonds, and the City Attorney and the Committees to draft such amendatory act to the act of 1905 that will enable the city to carry out the purposes of the act.

Abilene, Tex.—The Texas Brick Company will purchase machinery for a compressed water supply system.

Anson, Tex.—Citizens will soon vote $28,000 bonds for the construction of water works.

Atlanta, Tex.—Council has ordered an election to determine whether the city shall issue $15,000 in bonds to put in water works; election is ordered for April 6.

Beaumont, Tex.—The Commissioners Court is considering application of W. C. Teter for a franchise for water pipes on the country roads within a radius of five miles from the city limits.

Corpus Christi, Tex.—Citizens are considering a $37,000 bond issue for construction of water works.—O. O. Wright, City Secretary.

El Paso, Tex.—The Gila Farm Company is planning to build in Grant County, New Mexico, a monster dam three times as high as the government project at Elephant Butte and three times the size of the Assuan dam in Egypt; dam will have a reservoir with a capacity four times that of any in existence and will irrigate half a million acres.—Territorial Engineer Sullivan of New Mexico.

Mart, Tex.—Bids will be received for the purchase of all material necessary in the construction of a system of municipal water works, which will include steel water tower, return tubular boilers, cast-iron pipe and fittings, fire hydrants and watergate valves, water works pumps, boiler feed pumps, lead, oakum and other water works' supplies.—O'Neil Engineering Company, Dallas, Engineers; R. W. Bass, Mayor.

Mission, Tex.—Conway & Holt are considering the installation of 350-h.p. centrifugal pumping plant.

Salt Lake City, Utah.—Tenders will be received March 4 for brass fittings and piping used in making connections.

Bellingham, Wash.—The City Engineer will prepare an estimate of the cost of extending an 18-inch water main from the end of the proposed 24-inch pipe to James Street.

North Yakima, Wash.—The first steps toward municipal ownership of the water system of North Yakima have been taken; a resolution instructing the City Engineer to investigate the merits of the Rose artesian well and the cost of the Northwest Light and Water Company's plant has been passed.

Seattle, Wash.—City Engineer R. H. Thomson has estimated the cost of constructing sewers on Aurora and Linden avenues at $13,000.

Tacoma, Wash.—Water Superintendent H. A. Whitney has completed plans and specifications for the construction of the new high-service standpipe on Fletcher Heights; within a few days bids will be called for.

Waukesha, Wis.—Council has authorized a $26,000 bond issue for improving the municipal water plant; appropriation covers relaying about 3½ miles of mains, as well as building a new storage reservoir.—E. Merten, President Board of Water Commissioners; Fred Phelps, Secretary.

Exeter, Ont., Can.—Citizens are considering the repairing of the present water works system or the building of a new one.

Notre Dame de Grace, Que., Can.—Council

has passed a by-law providing for an appropriation of $350,000, of which $292,000 is to be set aside for the purchase of water works, power house and reservoir at Lachine; balance, $58,000, has been appropriated to extend the aqueduct from Westmount Plateau to beyond New Westmount; pipe has been purchased.

BIDS RECEIVED AND CONTRACTS AWARDED

Hope, Ark.—The contract for furnishing the boilers for the water works plant was awarded, February 11, to Casey & Hedges, of Chattanooga, Tenn., at $4,000.

Ft. Miley, Cal.—Mercer-Frazier Company, San Francisco, were awarded the contract, at $1,813, for moving and erecting steel tank and trestle.

San Bernardino, Cal.—H. F. Gansner, city, has been awarded contract at $5,900 for sinking well for the city at reservoir site; other bidders were: A. Caty, Los Angeles, $8,000; W. D. Anderson, San Bernardino, $7,500; Lapp & Gifford, Los Angeles, $7,300; the contract calls for sinking the well 1,000 feet with an 18-inch casing as far as possible, not less than 500 feet, and then reducing in size as it becomes necessary.

Santa Cruz, Cal.—Wolfe & Anthony were awarded contract, Feb. 15, for construction of a sewer system to include the following: 62,912 ft. 6-in. pipe, 32 cts.; 4,343 ft. 8-in., 40¼ cts; 2,290 ft. 10-in., 54¾ cts., and 16,834 ft. 12-in., 77¼ cts; total cost, $45,979; other bids received were: J. H. O'Brien, $65,000; J. C. Pratchner, $64,000; Wm. Healy, $53,555; Whitney Bros., $55,141; Contra Costa Construction Co., $74,000; C. D. Vincent, $56,997; Dunlevy & Lynch, $57,274; T. B. Downing Co., $56,881, and Mahoney Bros., $65,802.—L. G. Williams, City Engineer.

Englewood, Col.—The Consolidated Engineering Co., of Denver, has secured contract for constructing water works for about $100,000.

Palmetto, Fla.—City has awarded contract to R. D. Cole Manufacturing Co., Newnan, Ga., for 100-ft. water tower and tank, and to Coats Plumbing & Supply Co., Tampa, Fla., for engine pump and pipe; $15,000 bonds voted.—E. F. Wilson, Mayor.

Fitzgerald, Ga.—A. H. Hunnark, Secretary Water, Light and Bond Committee, writes that the Crane Co., of Birmingham, Ala., has secured contract for lead, and the R. D. Wood Co., of Philadelphia,Pa., for hydrants and valves for the proposed water works extension.

South Bend, Ind.—The Water Works Board, Feb. 24, received bids and awarded contract for cast-iron pipe, the lowest bidder being the Lynchburg Foundry Co., of Lynchburg, Va., to which concern the contract was let at $23.40 and $23.25 a ton; the bid of the United States Cast Iron Co. was $24.75. The contract calls for first quality and of not less than 250 tons nor more than 750 tons, and to stand the test of 350 pounds hydrostatic pressure before shipment.

Bids are being considered also for 300 water meters, gate valves and bids of transfer companies for hauling pipe and fittings to any part of the city during the year.

Eunice, La.—The Mayor and City Council have made arrangements with Mr. Porter, of Kentucky, the contractor of the Eunice water works, to finish up the work.

Baltimore, Md.—Joseph Schamberger, 2122 East Baltimore street, was awarded contract, February 17, for constructing the water tower station on South Gay street for the high-pressure fire service pipe line system for $23.890.

Duluth, Minn.—Capt. H. H. Thompson, a diver, made a proposal to the Board of Water and Light Commissioners to inspect the intake pipe at the Lakewood station for $100, and the proposal was accepted; the sum named was considerably lower than the ordinary charge on account of the ice now being formed in the lake, and the members of the Board decided it was a good time for having the pipe inspected.

Rochester, N. Y.—At the meeting of the Board of Contract and Supply, Feb. 24, all bids submitted for supplying meters for 1909 were returned unopened, and Secretary Pifer was directed to readvertise for proposals; there were three bids submitted, one by the National Meter Company of New York, another by the Thomson Meter Company of Brooklyn and a third by the Neptune Company of Buffalo. The Hersey Company, of Boston, did not submit a bid, but made a protest, through an attorney, on a clause in the specifications providing that the bidder has not furnished or offered to furnish to any municipality this year meters of a similar make at prices lower than specified in the bid. This clause will be modified in the specification on which bids are to be submitted this week.

Webster, N. Y.—Bids were received as follows, February 20, for the construction of a system of water works, consisting of about six miles of cast-iron pipe, pumping station, a small reservoir, stand pipe, power pumps and other appurtenances, bids received for the whole work, including or excluding the stand pipe and pumping equipment and separately for these.

Complete system: Fields, Barker & Underwood, Inc., Philadelphia, Pa., $40,030; Dean & Havens, Olean, $30,671; F. H. Falls, Rochester, $41,600; Holohan & Dailey, Rochester, $34,485.

Piping, reservoir, pump house and standpipe: Houston Barnard, Rochester, $30,480; McHarg-Barton Company, New York, $32,700; Robert Carter Company, Brooklyn, $33,000; Repton & Murphy, Rochester, $29,150; C. F. Hookway, Syracuse, $28,900; Delaney-Roberts Co., New York, $30,093; Whitmore, Rauber & Vicinus, Rochester, $31,600; Goodale & Jemison, Schenectady, $33,891.

Piping, reservoir and pump house: Fritz & Partridge, Dover, N. J., $26,289; C. R. Lewis, Ilion, $24,795; Kuhn & Applegate, Bradford, Pa., $26,375; Holler & Shephard, Rochester, $24,982; Burt Warren, Honeoye Falls, $26,992.

Stand pipe: Duffs Patents Company, Inc., Pittsburg, Pa., $2,860; Canton Boiler & Engine Company, Canton, O., $2,090; Des Moines Boiler and Iron Company, Des Moines, Ia., $2,088; Kinnicutt Water Supply Company, Chicago, Ill., $2,650; Walsh's Holyoke S. B. Works, Holyoke, Mass., $2,900; Standard Boiler and Pt. I. Co., Niles, O., $2,413; Chicago Bridge & Iron Co., Chicago, Ill., $2,200; Petroleum Iron Works Company, Sharon, Pa., $2,300; Ohio Boiler Company, Girard, O., $2,500; Connery & Co., Ltd., Philadelphia, Pa., $1,975; Walsh's Boiler and Iron Works,, Springfield, Mass., $2,500; Sharon Boiler Works, Sharon, Pa., $1,974.

Pumping equipment: Jeansville Iron Works Company, Hazleton, Pa., $2,490; N. C. Davison Co., Pittsburg, Pa., $2,363, not set; Fairbanks, Morse & Co., Cleveland, O., $2,500; D'Olier Eng. Company, Philadelphia, Pa., $1,800, volute pumps; Goulds Manufacturing Company, Seneca Falls, $2,520; Rumsey & Co., Ltd., Seneca Falls, $2,362. Several informal bids were also received.—Knight & Hopkins, Rome, Engineers.

Cincinnati, O.—Frank Burns secured contract to furnish the Water Works Department with cast-iron pipe and special castings for the year for $22,275.

Lorain, O.—Bids were opened by the Board of Public Service February 13 for 120 tons of 6-inch water pipe for East Erie avenue and other streets in the city: James B. Clow & Co., of Chicago, were the low bidders; the bids were: Massillon Iron and Steel Company, $24 per ton; the U. S. Cast Iron Pipe and Foundry Co., $23.60; James B. Clow & Co., $23.15.

Philadelphia, Pa.—The job for erecting the high-pressure pumping station at Seventh street and Lehigh avenue has been awarded by Director Clay to the Millard Construction Company; this same favored concern also got the contract for laying the mains, as far as the available cash will permit, from the old Fairholl reservoir into the Kensington mill district, that the new system is to protect from fire; the firm bid $360,000 for the pumping station, and gets a contract for $100,000 for laying pipe; there is but $500,000 available for the entire work; an additional $500,000 will be required for the pipe contract.

The bids submitted by the Millard Company for the pumping station, five in number, were scheduled as (a), (b), (c), (d) and (e), at $389,000, $367,000, $380,000, $373,000 and $360,000, the low price gaining the contract; the other bidders were James G. Doak & Co., (a), (b) and (c), $370,980, $397,980 and $426,812; John R. Wiggings & Co., three bids of $370,000, $385,000 and $425,000; Michael O'Rourke, $467,000; Sax & Abbott, $432,958, and E. F. Fonder & Co., $385,000.

As there is but $500,000 available for the pipe contract, it was decided to award a contract to the value of $100,000 for digging trenches, supplying and laying pipe. The bidders submitted a unit price, because the pipe contract in its entirety will amount to $600,000, and bids were received with the understanding that the bid was for the entire pipe contract. On this bid McNichol's firm was also low. The bids were: (a)flange pipe, gravel; (b) flange pipe, concrete; (c) Universal pipe, gravel base; (d) Universal pipe, concrete base: O'Rourke, (a) $615,557.30, (b) $623,057.30, (c) $646,564.10, (d) $652,064.10; Millard, (a) $593,337, (b) $594,987, (c) $592,944, (d) $594,594; McHugh, (a) $629,216.05, (b) $642,966.05, (c) $683,072.15, (d) $696,822.15.

Fort Getty, R. I.—The following are the bids opened, Feb. 23, by Capt. Willis C. Metcalf, Quartermaster, U. S. A., Newport, for construction of (a) water supply system and (b) sewer at Fort Getty, (c) time of completion: P. J. Murphy & Co., 165 Spring street, Newport, (a) $5,959, (b) 509, (c) 70 days; Darling & Slade, 56 North Main street, Fall River, Mass., (a) $5,459, (b) $330, (c) 4 months; Joseph P. Cotton, 201 Thames street, Newport, (a) $5,956, (b) $322, (c) June 30, 1909; Thomas B. Connolly, 339 Thames street, Newport, (a) $5,950, (b) $267, (c) 3 months; Michael A. McCormick, 4 Sherman street, Newport, (a) $7,376, (b) $390, (c) 90 days; John F. Johnston Co., 371 Central street, Fall River, Mass., (a) $6,455, (b) $235, (c) 3 months.

Nashville, Tenn.—The Nashville Plumbers, Mill and Supply Company were the lowest bidders on 325 valve boxes to be used in the building of new suburban water mains; the bid was as follows: On 10 6-inch valves, $2.50; on 25 12-inch valves, $2.80; the awarding was withheld for a few days, but the contract will probably go to the above-named company.

Dallas, Tex.—It was decided to purchase 36-inch water pipe for the replacing of the 36-inch wooden conduit for 4,200 feet of the way between Record Crossing and Turtle Creek from the United States Cast Iron Pipe and Foundry Company, at $28.80 f.o.b. Dallas; the same company's bid of $58 a ton for cast-iron bell and spigot, and $68 for double spigot and flange work, was also accepted; other bidders were the Dimmick Pipe Company and R. D. Wood & Co.

Rosebud, Tex.—Huston & Cunningham, engineers, 725 Maison Blanche Bldg., New Orleans, La., have contract for building water works system at Rosebud, estimated to cost $15,000, and are contracting for materials and construction work.

Sherman, Tex.—The Public Works Commission of Council are considering bids on the necessary mains to connect the new deep wells at the Fairview pumping station with the service mains; the contract was awarded a San Antonio company, for 4-inch pipe at $31 per ton, 6-inch at $29, and all specials at $54; the contract was also awarded for 50 new fire plugs at $25 each; these plugs are for the suburban betterment of fire protection service.

Richmond, Va.—The Water Works Department has let contract to the Piedmont Construction Company, Atlanta, Ga., for constructing about 5,500 feet of 54-inch reinforced concrete conduit.—E. E. Davis, Superintendent.

Sparta, Wis.—T. H. Iglehart, Morgan Park, Ill., was low bidder at $2,521.35, for laying 2,100 feet of 4-inch, 720 feet of 8-inch and 175 feet of 1½-inch water pipe, with seven manholes, for the city.—H. Teasdale, President Water Committee.

LIGHTING AND POWER

Opelika, Ala.—City is considering the installation of light and water supply.—W. C. Robinson, City Clerk.

Selma, Ala.—John H. Bolinger, 415 Alabama street, is considering the building of an electric light plant.

Globe, Ariz.—The Globe Gas & Electric Company will make extensive improvements to its plant, including construction of pipe lines for gas.

Heber, Ark.—City has granted John M. Covey, of Earle, a franchise for an electric light plant.

Oroville, Cal.—The Great Western Power Company will undertake the doubling of the present capacity of the electric plant at Big Bend; work will be begun as soon as the weather settles this spring; capacity will be increased to 144,000 h.p.; a dam will also be built; about $5,000,000 will be expended.—H. P. Wilson, Crocker Building, San Francisco, Secretary.

Redlands, Cal.—Steps have been taken by the Council toward the purchase of materials for the electric lighting plant; specifications have been approved and advertisement for bids for the following were ordered: One vertical cross-compound condensing engine, for connection to a 750-800 alternating-current generator of 60 cycles, 2,300 volts; one 750-800 k.w. turbo, generator unit with Terrill regulator and exciter, together with surface condenser and equipment; one 750-800-k.w., three-phase, 60-cycle, 2,300-volt engine-type alternating-current generator and Terrill regulator, together with a 50-k.w., 125-volt exciter; one surface condenser and equipment to be used with one 750-800-k.w. generator, direct-connected to a 1,200-h.p. cross-compound condensing engine; also pole, cross-arms, bolts, cross-arm pins, glass insulators, solder, friction tape and other material.

Redlands, Cal.—Council has given second reading to ordinance providing for issuing $150,000 electric lighting bonds.

Sonora, Cal.—City has granted the Tuolumne Water Power Company a franchise for an electric transmission line on public highways of the county.

Hartford, Conn.—On recommendation of the Finance and Street Boards, a sum not exceeding $500 will be included in the budget this year, for the erection of an electrolier and "isle of safety" on the corner of Pearl and Trumbull streets.

Torrington, Conn.—The Torrington Electric Light Company will enlarge plant and increase generating capacity; capital has been increased from $300,000 to $450,000.

Washington, D. C.—Attorney-General

Bonaparte has informed the Secretary of War that there is no legal impediment to the construction of a lighting, heating and power plant on reservation No. 17 (Garfield Park); Elliott Woods, Superintendent of the U. S. Capitol, will have charge of the construction of the building.

Leesburg, Fla.—The construction of electric light plant is being considered.

Augusta, Ga. — Georgia-Carolina Power Company has been chartered by N. B. Dial, of Laurens, S. C., J. L. Hankinson and W. G. Lancaster, to construct dam 25 feet high to develop 8,000 horsepower for transmission by electricity to Augusta and South Carolina cities; capital stock, $500,000.

Douglasville, Ga.—Citizens will vote either on issuance of bonds for construction of electric light plant or on granting franchise to J. D. House, of Douglasville; cost, $4,000 to $8,000.—J. R. Hutcheson, Mayor.

Elberton, Ga.—Citizens have voted $5,000 bonds for improvements to electric light plant.

Weiser, Ida.—The Idaho-Oregon Light & Power Company has been granted a franchise to furnish electricity; work will soon start on sub-station.—O. G. F. Markhus, Boise, General Manager.

Wataga, Ill.—Town has granted H. J. Kunkle a franchise to construct an electric light plant.

Anderson, Ind.—The Union Gaslight and Fuel Company of this city has contracted with E. G. Cowdery, of Chicago, for plans and specifications for the erection of a gas plant for the making of artificial gas in this city within a few months; cost of erection is to be about $125,000.

Evansville, Ind.—Mayor Boehne is urging municipal ownership of lighting plant.

LaFayette, Ind.—The Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, will erect an addition to their power house.

Orland, Ind.—Robt. N. Sanderson is considering the installation of an electric light plant.

Winslow, Ind.—The Town Council has been asked to grant a franchise to the Rodgers Gas & Oil Company, which proposes to lay mains, to supply the town with natural gas, from the big Rodgers gas well, recently drilled in the Arthur oil field; from Winslow the company will extend a main to this city and connect with the mains of the old Petersburg Mining & Gas Company.

Yorktown, Ind.—This village and others are considering the lighting of streets.

Davenport, Ia.—The Brady Street Progressive Association Committee, appointed to investigate the matter of street lighting, will recommend a five-light system.

Marshalltown, Ia.—Determined to secure public utilities, such as gas, electric light and power, which both in quantity and quality shall meet the public demand and at a cost which shall be just, business men of this city have subscribed $70,000 in stock of a $200,000 corporation which proposes to erect the plant.

Ossian, Ia.—Citizens will vote on construction of an electric light plant.

Shannon City, Ia.—Citizens are considering the establishment of an electric lighting plant.

Sioux City, Ia.—Work on the Perry and Bacon conduits will begin as soon as the frost is out of the ground; cost, $100,000.

Sylvia, Kan.—Citizens are considering propositions for the lighting of the city.

Catlettsburg, Ky.—The Columbia Gas and Oil Company will establish one of the largest gas compressing plants in the world; it is to have a registered pressure of 4,000 pounds; there will be two electrically-driven pumps whose capacity will be 6,500 gallons per minute; over $200,000 will be distributed during the process of the construction of the plant.

Maysville, Ky.—The City Council has appointed a committee to confer with the Cincinnati Gas Transportation Company to see what the chances are for Maysville securing gas.

Eastport, Me.—E. B. Nichols is promoting the construction of an electric light plant, to cost about $10,000.—W. F. Alexander, City Clerk.

Berlin, Md.—Specifications for installation of a complete electric light and water plant can be obtained from Mayor Orlando Harrison.

Denton, Md.—City has granted a franchise to Thomas F. Garey, of Baltimore, to construct an electric plant at his mill stream near town and transmit current for light and power purposes; system may be extended to Greensboro, Ridgely, Queen Anne's and Hillsboro.

Athol, Mass.—Wallace G. Webber, of Boston, has purchased one-third of the capital stock of the Athol Gas and Electric Lighting Company; Mr. Webber hopes to make arrangements whereby Athol will have improved gas and electric service; plant might run by water power instead of steam and company can furnish light at much less cost.

Falmouth, Mass.—One hundred dollars has been appropriated to install and maintain 18 street lights on the Falmouth Heights road.

Marion, Mass.—Selectmen are considering petition of Marion Gas Company to install a plant in Wareham to furnish light for Wareham and Marion.—W. H. H. Ryder, Chairman.

North Brookfield, Mass.—To provide adequate power for its increasing business the Oxford Linen Mills have just purchased extensive land and water rights on Mad Brook for an electrical plant of the most up-to-date kind; plans involve the building of a large dam, which will overflow at least 10 acres; from this point electrical power will be developed for transmission to the company's mills, two miles away; one or more turbine water wheels will be installed.—President F. E. Winchell.

Orange, Mass.—W. G. Webber, Boston, has purchased the plant of the Orange Electric Light Company and will make improvements.

Owosso, Mich.—A joint Committee of Council and the Owosso Improvement Association has assured the Owosso & Corunna Electric Company that if a lower rate for light and power were granted in the two cities and if the electric line was extended from Corunna to Durand, a new franchise and contract with the city to run for 30 years would be granted the company.

Minneapolis, Minn.—Council has been petitioned for a franchise by the Northern Heating & Lighting Company.

Mizpah, Minn.—Town has granted W. A. Potter a franchise for an electric light plant.

Charleston, Miss.—A company is being formed by Mr. Lamb, of the Lamb-Fish Company, to construct an electric light plant.

Hattiesburg, Miss.—The Hattiesburg Traction Company will increase the equipment of its power plant by installing two 500-k.w. turbo-generators and a motor generator set for railway service.—C. Z. Stephens, General Manager.

Boonville, Mo.—The Kemper Military Academy has selected Architect T. W. Bast, Sedalia, Mo., to prepare plans for an electric light plant.

Arapahoe, Neb.—Citizens have voted $6,000 bonds for a light plant.—E. C. Wagner, City Clerk.

Scotts Bluff, Neb.—B. A. Lathrop is promoting the construction of an electric light plant.

Tonopah, Nev.—Senator T. L. Oddie, of Tonopah, has secured an option on the power rights of Kings River and its tributaries at this point and will soon erect a power plant; about 300,000-horsepower will be developed.

Elizabeth, N. J.—The Board of Freeholders has authorized the Public Grounds and Buildings Committee to consider the advisability of building its own electric light plant to be used in lighting the County buildings.

Vineland, N. J.—A company has been formed with a capital of $100,000 to develop the water power of Maurice River; name adopted is the Maurice River Light, Heat and Power Company, and the promoters are E. C. Potter, of this place; E. W. Maloney, of Avondale, Pa.; B. F. Groff, hydraulic engineer, of Lancaster, Pa.; C. W. Shoemaker, the wealthy glass manufacturer, of Bridgeton, and Marcus Fry, of this place; over 1,200 acres of land has been purchased on which will be a lake of 10 acres, affording boating, fishing and skating for Vineland; a dam half a mile long is to be constructed immediately north of Landis avenue, which will furnish 16 feet of waterfall; company expects to furnish electricity at less cost than steam can be made; E. C. Potter will be Electrician and Superintendent.

Silver City, N. M.—J. B. Downey has purchased the plant of the New Mexico Light, Heat and Power Company; $15,000 will be expended in improvements.

New York, N. Y.—The Department of Correction has selected Architects Trowbridge and Livingston to prepare plans for a $80,000 power house.

Niagara Falls, N. Y.—The Electric Lighting Committee, Mayor R. P. Slater, of Niagara Falls, Ont.; Mayor Anthony C. Douglass, of Niagara Falls, N. Y., and with W. D'Arcy Ryan, illuminating expert, are considering the installation of a plant that will require an operating force of at least 700 horsepower.

Kinston, N. C.—City is considering an election on $75,000 bonds for extension of light system.

Bucyrus, O.—Council has granted to F. C. Kingsbury the privilege of erecting and maintaining poles, wires and appliances, including conduits and subways in the streets, alleys, lanes, squares, avenues, parks, bridges and other public places for the purpose of conveying electric energy.

Cincinnati, O.—The Board of Public Service has been requested to have plans prepared for a new electric light plant and a refrigerating plant for the city infirmary.

Columbus, O.—A petition has been filed with the Board of Public Service for the privilege of erecting three arches over West Broad street at Avondale square.

Dayton, O.—Councilman Cord will bring before Council in a few days resolution authorizing the proper committees to confer with the officials of the street and interurban railways relative to having the latter provide lighting on their rights-of-way; Mr. Cord is anxious to have the railway companies provide the lighting along their routes, as the city will be able to use the money saved by this change on the lighting of streets in the suburbs.

Hamilton, O.—Bids will be received March 19, noon, for $5,000 gas works bonds.—H. A. Grummer, City Auditor.

Minster, O.—Bids will be received March 20, noon, for $2,500 electric light bonds.—T. H. Laufersweiler, Village Clerk.

Struthers, O.—Council is considering a franchise for the use of electric lights for the streets.

Medford, Okla.—Citizens will vote March 17 on granting of franchise to Medford Ice, Light and Power Company for furnishing power to all city buildings.

Muskogee, Okla.—C. N. Haskell and D. N. Fink are reviewing plans for the construction of a power plant on the Grand River; plant to cost $1,000,000 will be built and electricity furnished to cities within a radius of 50 miles.

Tonkawa, Okla.—City is considering installation of an electric light plant; cost, $18,000.—J. P. Jarolemon, Mayor.

Baker City, Ore.—The Elkhorn Light and Power Company, of Baker City, has been incorporated by F. A. Harmon, L. Summers and John L. Rand; capital, $10,000.

Redmond, Ore.—The Crook County Light, Water and Power Company has been incorporated and will install and operate an electric light and power system and railway; also construct power plant at Cline Falls on Deschutes River.—J. H. Jackson, President.

Allentown, Pa.—The Lehigh Valley Transit Company will install an additional 5,000-kw. turbo-generator.

College Hill, Pa.—Citizens have voted $15,000 bonds to repair the electric light plant.—Carl S. Donaldson, Borough Engineer, Federal Trust Building, Beaver Falls.

Corry, Pa.—The Corry & Columbus Street Railway Company will purchase a generator and gas engine.

Central Falls, R. I.—Senate has passed in concurrence an act granting to the city the right to make a contract for five years, instead of for one year, for street lighting.

Iroquois, S. D.—Council has granted L. W. Liddle a franchise for an electric light plant.

Ramona, S. D.—A company will be formed to construct and operate an electric light plant.

Binghamton, Tenn.—J. A. Omberg, Jr., S. M. Neely, W. M. Boyle, F. W. Faxon and others compose a company who will construct an electric light plant; new company will be known as the Binghamton Electric Power Company and incorporated with $25,000 capital; it is the intention of the company to furnish lights for the town of Binghamton and the neighborhood surrounding it; cost, $15,000.

Johnson City, Tenn.—The Wautaga Electric Company will soon purchase two 120-kw. motor generator sets.

Spring Hill, Tenn.—The Spring Hill Mills is considering installation of electric lighting plant.—Cheek, Andrews & Jones, Proprietors.

Whiteville, Tenn.—City will be lighted by electricity in the near future; plant, costing not less than $5,000, will be owned and run by Messrs. Ed. Stewart and Rivers Norment.

Atlanta, Tex.—Citizens are considering a proposition of putting in a natural gas line; city is only seven miles from the pipe line connecting Texarkana with the gas field.

Crowell, Tex.—Council has granted to L. G. Andrews and W. L. Campbell a franchise for electric lighting.

Galveston, Tex.—Congress is considering a bill appropriating $15,000 for laying pipes and light wires from Galveston to the Immigration Station.

Houston Heights, Tex.—Council has granted the Houston Electric Company a 30-year franchise.

Sherman, Tex.—All of the 80 street lamps now in use and located will be replaced by new ones in the general rehabilitation of the plant, and with one exception, left where they are now; lamp now at intersection of Crockett and King Streets will be moved about 300 feet north.

Snyder, Tex.—Council has granted a franchise to R. F. Brumbach and his associates of Ennis, Tex., or the installation of an electric light plant; work to begin within 60 days; Mr. Brumbach and associates will put in an electric light and power system that will be amply sufficient to supply a city of 8,000 to 10,000 population, an up-to-date plant in every particular.

Wharton, Tex.—City has granted J. J. Wensley, Manager Wharton Ice and Cold Storage Company, a 50-year franchise for erection of electric light plant.

Fredericksburg, Va.—The Electric Gener-

ating Company will lease water power from Fredericksburg Power Company and build electric plant with capacity of 2,000 horsepower; William C. Whitner, President of Fredericksburg Power Company, will act as Consulting Engineer in preparation of plans for power house and hydraulic development.

Roanoke, Va.—C. S. Wenger, Consulting Hydraulic Engineer, Brownstown, Pa., has prepared plans for the Craig Water Power Company for electric power plants to develop water power of Meadow and John's creeks; plant at former place will have capacity of 25,000 horsepower under 800-foot head; equipment will consist of two impulse water wheel driven units, direct connected, of 700 kilowatts each.—A. L. Sibert, President.

Tacoma, Wash.—Council is considering ordinances instructing the Commissioners of Public Works to install street lights at Sixty-fourth street and Puget Sound avenue, on Union avenue and at South Sixty-fourth and Montgomery streets.

Pennsboro, W. Va.—Council has received a petition from O. E. Pratt for franchise to construct electric light and power plant.

Lander, Wyo.—City has granted Fred D. Hammond a 50-year franchise from Town Council to pipe oil into city for generation of gas, and to lay pipes for distribution of such gas.

Kamloops, B. C., Can.—City has selected H. K. Dutcher, of Cleveland, O., and Vancouver, B. C., to make a report on a scheme for reorganizing the municipal electric lighting and pumping plant.

Peking, China.—The Chinese Government has selected Architects Milburn, Heister & Co., Washington, D. C., to prepare plans for gas and electric light plants, to be constructed at Peking.

BIDS RECEIVED AND CONTRACTS AWARDED

Moline, Ill.—Council has renewed the contract with the Tri-City Railway and Lighting Company or the People's Power Company, which has been furnishing the city with street lights, the only one to submit a bid, at $60 a light per year; the bid was referred to another meeting, when it will be accepted.

Davenport, Ia.—The special committee appointed to inquire into the bid of the People's Power Co. to furnish lights to the city met at the office of Mayor Schaffer and Superintendent F. W. Reimers of the company was present; it was decided to recommend to Council that the bid be accepted; the company proposes to furnish street lights at $60 and alley lights at $33. The special committee is composed of Aldermen Blochlinger, Carse, Tuckis, Thompson, Trefz and Ellinwood.

Topeka, Kan.—The report of the Electric Light Commissioners was listened to February 16 and the Mayor and Council were authorized to enter into contract with the Westinghouse firm for the remodeling of the old electric light plant equipment; the Columbian bid of St. Joseph was thrown out on account of its failure to comply with the request; referring to the Westinghouse bid, the Electric Light Commissioners discussed the matter thoroughly and, referring the matter back to a special committee of the Council, decided to accept the bid of $21,485 less the engine and direct-connected generator outfit amounting to $985, also 400 absolute cut out amounting to $1,380, which made total deduction of $2,365; further recommendations that separate contract be made with the Westinghouse Company to cover their option on 100 extra lamps and the 5,000 pair of electrodes worded in such a way that the city could purchase in 18 months either 50 lamps and appropriate outfit complete at $44 per lamp, or 100 lamps and appropriate outfit at $44 per lamp.

Houma, La.—The town of Houma has closed a deal for a modern electric lighting plant, contracts being made with the Erie City (Pa.) Iron Works, Fort Wayne (Ind.) Electric Works and the Wesco Supply Company, of St. Louis, Mo.

Duluth, Minn.—The Board of Water and Light Commissioners has under advisement the bids submitted for furnishing an electric pump, to be installed in the new pump house for the middle system; four bids were received, two on a centrifugal pump and two on a double-acting triplex pump; the General Electric Company offers to furnish for $7,100 a centrifugal pump, to be built by the I. P. Morris Company, which built the pump at Lakewood; the bid, together with all of the others received, is for the furnishing of the pump and equipment complete, covering also the cost of installation. The Power Equipment Company offers to furnish a centrifugal pump for $6,448; the bid is on what is known as a Morris pump, though not the same as the I. P. Morris pump, which the General Electric Company offers to furnish; the efficiency of the former is nearly 58 per cent. over all, while the efficiency of the latter is about 52¼ per cent. over all. The General Electric Company offers to furnish a double-acting triplex pump with a guaranteed efficiency of nearly 73 per cent. over all for $6,400, while the Power Equipment Company will furnish a pump of similar design with an efficiency of 74 per cent. over all for $7,339.

Albany, N. Y.—The contracts for supplying the New York State Hospitals for Insane with 25,000 incandescent lamps for the year beginning March 1, 1909, has been awarded to Fairbanks, Morse & Co., of New York City.

Bergen, N. Y.—Seventeen proposals for furnishing material and labor to make a complete installation of an electric light plant were opened February 20 by the Village Board; the contract for an engine, two 70-h.p. boilers and a generator was awarded to Myron E. Whitham, of Rochester, representing the Ridgway Dynamo and Engine Company, of Ridgway, Pa., for $4,200; the contract for line supplies was awarded to the Rochester Electric Motor Company for the net sum of $1,021; the work is to be completed in 60 work days from the date of the award of contracts. The village has been without electric lights since March 25, 1908.

Bucyrus, O.—After having voted for a municipal lighting plant and beeen enjoined from issuing the bonds, Council, February 19, opened bids for lighting the city by private enterprise, granted a franchise, awarded and signed a contract, all within two hours; the successful bidder was F. C. Kingsbury, of Columbus, a representative of the Westinghouse Company; the price is $74.50 per arc lamp on an all-night schedule and $69 per lamp on a moonlight schedule; the new plant is to be in operation within eight months; the present company also bid, but its bid was thrown out as irregular.

Cincinnati, O.—The contract for the wiring of the Eden Park water tower for the ornamental lighting of it was, February 20, awarded by the Board of Public Service to the Richter Electrical Company at its bid of $1,475.

Beaumont, Tex.—The Beaumont Ice, Light and Refrigerating Company has sent a communication to the Council calling attention to the lighting contract which expired on February 3; the company offers to renew the contract at the same rate for five years more; or the company agreed to make a contract for five years to furnish as many as 100 6.6 ampere, closed series lights to burn 4,000 hours per year, at $90 per year per lamp, and to furnish all additional lamps over the 100 at $85 per year; the previous rate was $96 per year per light; the proposal was referred to the Light Committee.

Terrell, Tex.—The contract for the city electric light plant was awarded February 20 to Houston & Cunningham, of New Orleans, $14,783.53; they let the contract for the building to T. D. Greathouse, of Terrell, for $1,788.78.—E. R. Miller, City Secretary.

Tenino, Wash.—The engineering office of Edwin G. Amme, of Portland, Ore., has secured contract for building a new power house and the installation of a 150-kw. alternator and a 500-volt power equipment for the Tenino Light, Water & Power Co.

Milwaukee, Wis.—Bids were opened, Feb. 17, by the Board of Public Works for furnishing and erecting in running order, ready for use, machinery and appurtenances for a gas producer and a gas engine electric lighting plant at Walker and Davidson streets, and the following bids were received: Allis-Chalmers Co., Milwaukee, 4 bids, Plans A, B, C and D, $125,000, $140,000, $170,000, and $187,000, and the John S. Metcalf Co., Chicago, Ill., 2 bids, $155,205 and $144,860.—J. P. Sherer, Commissioner of Public Works.

Niagara Falls, Ont., Can.—Contracts for the electrical equipment of twelve of the stations on the transmission line between Toronto and Niagara Falls and St. Thomas have been awarded; two-thirds of the equipment has been awarded to the Canadian General Electric Co. and about one-third to the Canadian Westinghouse Co.

FIRE EQUIPMENT

Tucson, Ariz.—Council has instructed the City Recorder to advertise for bids for the construction of a fire house.

Los Angeles, Cal.—Architects Edelman & Barnett are preparing plans for a fire engine house.

Bristol, Conn.—The Board of Fire Commissioners has had plans prepared for a fire engine house; chemical engine and hose and ladder equipment will be installed in the building as soon as it is completed; bids have been asked from local contractors.

Miamus, Conn.—City is considering purchase of an auto fire engine.

New Britain, Conn.—Chief Dunn has recommended the purchase of an automobile chemical engine.

Athens, Ga.—City may at an early date add another company to its present strong and up-to-date Fire Department; Committee is now seeking a good location for a new fire hall and is also considering purchase of a new hose wagon and 1,000 feet of hose.

Lewiston, Ida.—City will ask bids for a combination hose wagon and installing two fire alarm boxes.—Fire Commissioner Phillips.

Chicago, Ill.—Chief Jas. Horan has recommended the purchase of a new automobile chemical engine and hose wagon, each carrying a chemical tank holding 600 gallons; $1,630,000 is also asked to build up the service.

Jacksonville, Ill.—Fire Committee has advertised bids for the purchase of 600 feet of hose.

Joliet, Ill.—The City Clerk has been instructed to advertise for bids for supplying hose for the Fire Department, also a modern hose cart and chemical wagon and an aerial truck and 75-foot extension ladder and accessories.

Moline, Ill.—All bids on the new hose house for East Moline have been rejected by the Building and Grounds Committee composed of W. F. Salzmann, Frank Wylie and W. C. Dralle; bids were all incomplete and a new set of specifications were made out.

Gary, Ind.—City is considering the purchase of a combination hose and chemical engine.

Mason City, Ia.—Council has appropriated $400 for additional hose.—Chief Cadwell.

Newton, Kan.—Citizens are urging the purchase of better fire apparatus.

Topeka, Kan.—Chief Wilmarth of the Fire Department has been instructed by Council to furnish an estimate of the cost of the hose and all other uptown equipment for extending a high pressure water system.

Ashland, Ky.—Citizens are urging the purchase of a new fire wagon.—Mayor Mathewson.

New Orleans, La.—Architect E. A. Christy has prepared plans for an engine house.

Williamsport, Md.—Council has adopted an ordinance providing for an extra levy of ten cents on the hundred dollars each year for a period of five years for the purpose of equipping and maintaining a more adequate Fire Department and building storage cisterns in the town.

Everett, Mass.—Mayor Chas. Bruce has recommended the purchase of an additional engine.

Falmouth, Mass.—Citizens are urging the erection of a hose house at Woods Hole.

Lawrence, Mass.—The Hampton Beach Improvement Association is considering the erection of a house for the firemen and apparatus.—A. W. Saunders, Lowell.

Pittsfield, Mass.—The Finance Committee has granted the Fire Department an increase of $7,567.50; new hose, ladders and a steamer will be purchased.

Springfield, Mass.—City has an option on St. Paul Universalist Church and is considering the site for fire department headquarters; the Board of Fire Commissioners are urging the purchase of a site at the corner of Chestnut and Bridge streets for fire headquarters; building to be equipped with motor apparatus.

Laurium, Mich.—City is considering the purchase of a life-net.—Fire Chief Preuss.

Duluth, Minn.—Fire Chief Black has been ordered to install eight fire alarm boxes.

St. Paul, Minn.—City will soon receive bids for an 85-foot aerial truck equipped with latest ladders.—Fire Chief Strapp.

Jackson, Miss.—The demolishing of the old engine in Station No. 2 will compel the department to purchase a new apparatus of some kind; Chief Cummings is in favor of the combination auto fire wagon, which he states would cost not more than $2,000 or $3,000 over the price of the horse style apparatus, and would take the place of both engine and hose wagon.

Madison, N. J.—Town will install fire alarm system.

Morristown, N. J.—Committee, composed of Adam Bowers, Foreman Company No. 1, and Edw. Noyes, has visited Newburgh, N. Y., to look over the stock of Delaney and Colvell; a hose wagon may be purchased.

Nutley, N. J.—A site will be purchased on High Street for the West Nutley hose house.

Prospect Park, N. J.—Volunteer Hose Company is considering the purchase of 12 water buckets, three hooks, a 30-foot ladder and two lanterns.—Krine Hook, President.

Lockport, N. Y.—Chief Engineer Cunningham of the Fire Department has recommended to the Board of Fire Commissioners the purchase of a second-size steam

fire engine and a new 75-foot aerial truck.

Poughkeepsie, N. Y.—Fire Chief Nagengast has recommended the purchase of three chemical combination hose wagons.

Schenectady, N. Y.—The Board of Contract and Supply has ordered bids advertised for 2,000 feet of 2½ and 3-inch hose.

Durham, N. C.—The Fire Committee will purchase house gong for the homes of the partially paid runners.

Crooksville, O.—Citizens are considering a $30,000 bond issue for fire equipment and a water works system.

Crooksville, O.—The Fire Committee has been authorized to expend $25,000 for fire extinguishers.

Ardmore, Okla.—Citizens will vote March 23 on $20,000 Fire Department bonds.

Chester, Pa.—Council has adopted suggestion that another lot be purchased in the business district for a fire station.

Chester, Pa.—Fire companies are urging the establishment of a modern fire alarm system to take the place of the present telephone mode of sending in alarms.

Franklin, Pa.—Council has approved the recommendation of the Fire Committee that an automobile fire hose cart be added to the equipment of No. 1 hose house.

Hazleton, Pa.—Select Council has finally passed ordinances authorizing the City Engineer to prepare specifications, advertise for and submit to Councils proposals for the extension of the present fire alarm system; providing for the purchase of 2,000 feet of fire hose; providing for the advertisement for bids and providing for the expense of said purchase, and providing for the purchase of rubber coats for the Pioneer Fire Company, authorizing the advertisement for bids and providing for the payment of same; Council is also considering a $5,000 appropriation for an automobile engine.

West Point, Pa.—Four chemical hand-extinguishers and a number of buckets will be purchased for the fire department.

Wilkes-Barre, Pa.—City is considering the need of a combination wagon, horseless or gasoline, a new combination horseless chemical engine, new No. 3 house, new and lighter engine, light village truck to cover heights, new engine house and steamer for No. 8, more hose, wires placed underground, and a full-paid department. —Fire Chief Schuler.

Woonsocket, R. I.—City is considering purchase of a new steamer and 1,500 feet of hose.—H. J. Cote, Fire Chief.

Greenville, S. C.—Citizens are considering the installation of the Gamewell fire alarm system, erection of a fire station in Ward One and purchase of 1,000 feet of hose.—Riley J. Rowley, Fire Chief.

Newberry, S. C.—Chief Henry Wells and others are urging the purchase of a hook and ladder truck and a chemical engine.

Park City, Tenn.—Bids are now being received by Geo. F. Barber & Co., for the construction of the Park City fire hall; this building will be of brick and will be two stories.

Houston, Tex.—Citizens of Chaneyville and Vick's Park have organized a Fire Department; a chemical engine and other apparatus will be purchased.—Dr. Robert Vick, President.

Houston, Tex.—City Commissioner Jas. Appleby will recommend the construction of a new fire station in the South End.

Lott, Falls County, Tex.—City will soon take over the old firemen's hall, add to and improve it and put in more up-to-date apparatus for the department.

Danville, Va.—Council is considering a recommendation from the Fire Committee appropriating $5,000 for a new engine.

Norfolk, Va.—The Board of Control has been requested to secure estimates of the cost of erecting new fire and police stations in Berkley ward, also to estimate the cost of repairing the present stations.

Georgetown, Wash.—Plans for a combined City Hall and Fire Department headquarters will have to be changed, as the Volunteers have decided to erect a separate building.

Seattle, Wash.—Chief H. W. Bringhurst is urging $5,000 appropriation for repairs on the fireboat Snoqualmie.

Hartford, Wis.—Town is considering the purchase of 600 feet of hose and a hose wagon.—Fire Chief Kanter.

BIDS RECEIVED AND CONTRACTS AWARDED

Washington, D. C.—Bids were opened for the reconstruction of a second-sized fire engine, worn out by long use, and the American La France Fire Engine Company, of Elmira, N. Y., put in the lowest bid, offering to do the work for $3,214; the Woodhouse Manufacturing Company, of New York City, bid $3,265, and the American Fire Engine Company, of Cincinnati, O., offered to carry out the specifications for $3,300; M. C. Hargrove, Property Clerk, and F. J. Wagner, Fire Chief, will make recommendations to the Commissioners as to which firm should receive the contract.

Louisville, Ky.—The Board of Public Safety, February 19, awarded a contract to S. A. Hilpp & Co. to supply the firemen with 275 uniforms, more or less, for spring and summer wear, the contract price being $12.50 for each uniform; this is the lowest price at which uniforms were contracted for in a long time.

New Orleans, La.—For a two-story frame engine house in Algiers, John Reusch bid $8,222; M. & B. Garsand, $8,000; Arthur Liebe, $10,162.50; John Minot, $8,450; Brown & Ward, $8,500; Frank A. Moullet & Son, $8,987; Jos. W. Lennox, $7,948; Miche, Chesse & Co., $9,182; John A. Chisholm & Co., $8,270; George H. Gessner, $8,262.

Lincoln, Neb.—Contract for sub-station for Fire Department, at Twenty-seventh and Pear streets, has been let to C. Freeman Barras, at $2,764.—Thos. H. Pratt, City Clerk.

Cranford, N. J.—Jas. T. McGall, Plainfield, was low bidder for erecting two-story fire house, North avenue, at $3,915.—C. L. Bell, Architect.

Durham, N. C.—The Aldermen have placed orders for a combination chemical and hose wagon and for an additional 1,000 ft. of fire hose, the matter of making the purchases being turned over to Purchasing Agent Pridgen; the fire hose order going to the Eureka Hose Company and the truck order going to the La France Engine Co., of Elmira, N. Y.

Youngstown, O.—Contract for fire station has been let to John H. Link, for $3,300.—Kling & Zenk, Architects.

Ft. Stevens, Ore.—E. Gustafson, Astoria, has contract for constructing one double set of firemen's quarters at Ft. Stevens.

Pittston, Pa.—The first move toward furnishing the Fire Department with better equipment was taken at a joint session of Councils, when the Fabric Hose Co. was successful in securing a contract for 1,000 ft. of Keystone brand four-ply hose at $1 per ft.; others who bid for the work included the Eureka Fire Hose Co., the Boston Woven Rubber Co. and the Exeter Machine Works.

Dallas, Tex.—The contract for the construction of the combination chemical and hose wagon for the Oak Lawn fire station was awarded to the American La France Fire Engine Company, on its bid of $1,260; it will take from four to six months to fill the contract; by that time it is expected by Mr. Seay to have the new station ready; other bidders were American Coupling and Fire Engine Company, $1,260; Robinson Fire Appliance Manufacturing Company, $1,324, and the Seagrave Company, $1,375; Mr. Seay recommended the first, as much of the present apparatus is by that company and the other bidder of like amount is not so well known to the city Fire Department.

Houston, Tex.—Ed Kiam has been awarded the contract for furnishing the police and firemen of Houston with their spring uniforms.

Chehalis, Wash.—At the meeting of the City Council, February 15, bids for the purchase of a combination chemical and hose wagon were submitted, and also for 1,000 feet of hose; there were five bids for combination wagons ranging in price from $1,500 to $1,800; the Council awarded the contract for a chemical and hose wagon to the La France Fire Engine Company for $1,800, and the 1,000 feet of hose contract to the Fabric Fire Hose Company, at 90 cents per foot; the chemical engine and hose wagon is to be delivered in 60 days.

ELECTRIC RAILWAYS

Huntsville, Ala.—The Huntsville Railway will begin construction of the proposed line to Monte Sano very soon.—E. L. Pulley, General Manager.

San Diego, Cal.—The San Diego & El Cajon Valley Interurban Railway has been incorporated to build an electric railway from La Mesa Springs northeast through Alta to a point near Lakeside; distance, 15 miles.—William B. Gross, Edward Fletcher, Pasadena, and Thomas Ballantyne, El Cajon, Directors.

San Diego, Cal.—The San Diego Electric Railway Company has made application to Council for a franchise for a new extension, which will commence at Tenth and K streets and terminate at Thirteenth and R streets.—Chas. McLagan, Chief Engineer.

Washington, D. C.—The House bill authorizing the extension of the City and Suburban Railway of the District on Monroe street off E, from the intersection of Monroe street and Michigan avenue over the Monroe street bridge to the boundary line of the District, amended by appending to it the Senate bill authorizing the Washington, Spa Springs and Gretta Railroad Company of Maryland to enter the District, has been passed.

Peoria, Ill.—The Peoria & Galesburg Railway Company has made surveys and partly secured right of way for its proposed electric railway; road will be constructed from Peoria through Peoria and Knox Counties to Galesburg, and from Peoria through Peoria and Fulton Counties to Canton, Fulton County; distance, 75 miles.—D. M. Mayer, President, and S. F. Atwood, Secretary and Treasurer.

Evansville, Ind.—The Henderson Route Company is planning extensive improvements for the road between Henderson and Louisville, Ky.; Head Engineer has been at work on observations and estimates of the cost of substituting cement work where wood is now in use in bridges and culverts; management is now waiting for favorable weather before putting their gangs to work; expenditure of approximately $75,000 is contemplated for these improvements alone; road will also be ballasted as soon as the rock crusher can be gotten in action.

Lawrence, Kan.—Cyrus Meade, Albert Emmanuel and W. R. Sullivan, all of Dayton, O., have asked for a franchise granting them the right to put in a local electric line and also to furnish power and light in the city.

Topeka, Kan.—If present plans are realized the Kansas City & Olathe Electric Railroad will be extended from its present terminus at Shawnee, Kan., to Topeka, by way of Lawrence; line was originally projected by way of Olathe, but in order to shorten the line the final survey was changed to run west several miles north of Olathe; road is now built and in operation from Rosedale, Kan., to Shawnee, a distance of seven miles, with the power house located at Merriam, Kan.; mileage of the completed line will be sixty-six miles.

Hopkinsville, Ky.—Stockholders of the City Light Company are considering the construction of a street railway.—E. K. Dewey, Vice-president and General Manager.

Lewiston, Me.—The Legislature is considering a bill incorporating the Androscoggin Railroad Company, which proposes to build a street railway in the towns of East Livermore, Livermore and Turner; capital stock, $300,000.—Hewitt M. Lowe, Turner; John A. Jones and Albert M. Kavanaugh, Lewiston; Harry Manser, Auburn; Frank W. Brigham, Boston, Incorporators.

Salisbury, Md.—The Wicomico Electric & Power Company is receiving bids for construction of an electric railway between Salisbury and Nanticoke Point; distance, 24 miles.—Marion V. Brewington, President; Jesse D. Price, General Manager; Mark Cooper, Secretary.

Kansas City, Mo.—Another electric road project is making progress; company is the Kansas City, Olathe, Ottawa & Iola Railroad company; proposed line connects Kansas City and Iola by way of Olathe and Ottawa; survey has been completed between Iola and Ottawa and surveyors are now at work between Ottawa and Kansas City.—Hugh A. Holmes is promoting the project.

Kansas City, Mo.—The Kansas City Junction Railway Company, organized in Kansas by a syndicate headed by George Townsend, a railroad builder of Indianapolis, has started proceedings in Kansas City, Kan., to condemn a right of way for a belt or connecting railway terminal project; Commission composed of Herman Kreuger, C. W. Kerr and C. C. Glandon has been appointed by Judge E. L. Fischer to begin work in 30 days.

Kansas City, Mo.—Two important steps in connection with the building of the proposed electric line between Kansas City and Jefferson City, have been taken; mortgage for five million dollars in favor of the Carnegie Trust Company has been filed with the County Recorder, and an application has been sent to the Secretary of State for permission to increase the capital stock of the Kansas City Southeastern Traction Company that is to build and operate the new electric road; line has been surveyed through Leeds, Raytown, Little Blue, Lees Summit to Lone Jack, and actual construction work is being done in a rock cut two miles north of Raytown; road has been divided into division, to be built in consecutive order; first division is from Kansas City to Lone Jack, a distance of 30 miles; second division takes the line to Warrensburg and the third to Jefferson City, 125 miles from Kansas City; two branch lines, one from Lee's Summit to Harrisonville, and another from Pittsville to Clinton, are contemplated; the project has been financed and necessary franchises and rights of way have been secured from Kansas City to Lone Jack, and the line has been surveyed to Jefferson City and to Harrisonville and Clinton.—Charles A. S. Sims, President; J. C. Herring, Chief Engineer; C. G. Minturn, Secretary; Benjamin F. Shouse, Treasurer; they, with George P. Norton, W. N. Collins, Maynard

D. Garner and T. D. Hughes, constitute the Board of Directors.

Great Falls, Mont.—The Freeholders have granted to G. Calvin Bower and his associates a franchise for a street railway in connection with their proposed electric railway between Great Falls and Choteau.

Paterson, N. J.—Financial interests closely allied with William G. McAdoo, President of the Hudson companies, which is constructing the McAdoo tunnel system under the Hudson River, are actively preparing for the construction of a high-speed electric line from Paterson to Hoboken, to connect with the Hudson River tunnels there, as well as for a trolley line from Suffern, N. Y., to Paterson, to feed the proposed rapid transit line at that point; engineers have made preparations toward beginning actual work, by getting bids on machinery for a temporary construction plant, which will include a temporary power house.

Brooklyn, N. Y.—The Sub-Committee of the Board of Estimate is considering a suitable plan for granting a franchise for a street railroad on Thomson avenue and Hoffman boulevard, in Long Island City and Newtown and over the Queensboro bridge.

Oswego, N. Y.—The City Traction Company has been incorporated to build and operate an electric railway from Oswego to Seneca Hill, in Oswego County; capital stock, $550,000.—C. B. Benson, Minetto; William Nottingham and Clifford D. Beebe, Syracuse, and Harold C. Beatty, Skaneateles, Directors.

Rome, N. Y.—The Rome City Street Railway Company, controlled by the Utica & Mohawk Valley Railroad Company, will soon ask permission of the Common Council and of the property owners along proposed new routes for the extension of the local system; lines proposed are to extend the West Dominick Street line from its present terminus at Expense Street to Charles Street, and the East Dominick Street line from the locomotive works to the St. Peters Cemetery, and an addition line from Dominick Street up Madison Street to connect with the belt line at the corner of Thomas and Madison Streets, and another extension from the corner of Thomas and Expense Streets to the Rome Cemetery; also to extend the James Street line from Linden Street to Ridge Mills, with the idea of extending that line later on to the Delta dam at the Palisades.

Vernon, N. Y.—Town Board has granted a franchise to the Oneida Railway to construct a street railway from Sherrill to Kenwood.

Whitestone, N. Y.—By April 1 work will commence at Whitestone for the trolley and the cars will be in operation in about four months; bridge on Eighth avenue, Whitestone, will have to be rebuilt; the New York and North Shore Traction Company has taken the matter in hand.—Engineer Clark.

Athens, O.—B. B. Putnam and D. A. Bartlett, of Marietta, O., are promoting the construction of electric lines to connect Athens, O., with Nelsonville and Gloucester; distance about 14 miles.

Toledo, O.—As a result of negotiations under way between the Toledo & Western Railway and the St. Joseph Valley Interurban, the gap may be closed in the spring that will give Toledo a through trolley service to Chicago; building of a 20-mile extension will connect the two roads and make the through Toledo-Chicago line possible; proposition to build a part of the line will probably be put up to the directors of the Big Con.; the Bucklin syndicate will also build part of the line.

Durant, Okla.—Col. J. D. Powers and W. S. Sterrett will build an electric interurban railway that will connect Durant with a number of other cities and towns in Bryan County; length, about 50 miles.

Bend, Ore.—The Crook County Water, Light and Power Company has been incorporated to build an electric railway from Redmond to Prineville, also to build and operate power plants; capital stock, $50,000.—J. H. Jackson, Redmond, President.

Milwaukee, Ore.—Mayor Street and members of the Council have gone over the ground desired by the Beaverton & Willsburg for right-of-way; new road will enter the town over a trestle 20 feet above the O. W. P. track a short distance north of Island Station; road will be built on a level grade through Milwaukie.

Belleville, Pa.—The Belleville & Reedsville Railway Company will commence construction this summer on its proposed line which is to connect Belleville and Reedsville; distance, 10 miles.—L. M. Yoder, Belleville, President; F. W. Warner, Belleville, Secretary and Treasurer.

Harrisburg, Pa.—The Central Pennsylvania Traction Company will purchase about two miles of rails for city extensions.

Lansdowne, Pa.—Borough Councils have passed an ordinance granting the right of way for a double-track trolley road through the borough to the Philadelphia & Delaware Electric Railroad Company, a subsidiary road of the Interstate Railway Company, which was restrained by injunction from receiving a franchise from the borough.

Lyons, Pa.—The Allentown & Reading Traction Company is making the surveys for the extension of its lines from Lyons to Trexlertown or East Texas; line will connect with the present line of the Allentown & Reading Traction Company at Lyons and is then to run through Bowers, Hancock, Topton, Mertztown, Shamrock, Alburtis, Trexlertown and possibly East Texas.

Philadelphia, Pa.—Bustleton Merchants have called on Mayor Reyburn to enlist his aid in a movement for the construction of a trolley road from Cedar Hill, Frankford, to Bustleton; distance about 4½ miles; cost, $150,000.—Dr. Joseph C. Tustin, Chas. Dungan, R. B. Twining, C. H. Hyer and John Fisher.

Pittsburg, Pa.—A trolley system for freight and passenger traffic in sections of Pennsylvania and West Virginia is being advocated by W. E. Hildebrand Company, for which a charter will soon be asked, will be, in part, made up of Western Pennsylvanians and West Virginians; present plans call for a company to be known as the Pittsburg, Morgantown & Grafton Railroad Company; title is extensive, inasmuch as the promoters plans, for the first construction at least, incorporate only a main line from Washington, Pa., through the country by the most direct route to Marianna, where the mines of the Pittsburg-Buffalo Company are situated, and thence to Waynesburg; from Waynesburg a line will be constructed to Morgantown, W. Va.; a branch line is proposed from Waynesburg to Brownsville, to connect with the Pittsburg Railways Company's Charleroi line; system calls for another "main" line, to extend from Uniontown through Point Marion and thence to Morgantown, the latter line to traverse the watershed several miles eastward of the Monongahela River; from Uniontown this line is expected to have a branch line to Brownsville to connect with the West Penn Railway Company's line. E. M. Grant, of Morgantown, W. Va.; Joseph McDermott, David Elkins, son of United States Senator Stephen B. Elkins, of West Virginia; I. F. Lazzelle, of Morgantown, W. Va.; James I. Iams, of Waynesburg, and Congressman George C. Sturgiss, of West Virginia, will be the incorporators; James Bryan, Engineer in charge of the construction of the Pittsburg, Harmony, Butler & New Castle Railway, will, within the next two weeks, be empowered to make the surveys of the lines.

York, Pa.—Prominent citizens of Delta and vicinity are discussing plans for the building of a railroad from Delta to Fawn Grove; new road will be about seven miles long; connection will be made at Fawn Grove with the New Park & Fawn Grove Railroad, so that cars could be sent through to New Freedom, where connections could be made with the Northern Central; two Committees have been appointed, one representing Delta composed as follows: T. J. Brooks, W. Scott Whiteford, John W. Jones, Amos B. Harrison and Harry Hughes; and the other, Fawn Grove, consisting of John C. Wiley, H. F. Merriman, Joseph W. Anderson, B. F. Morris and Joseph A. Gehley.

Greenville, S. C.—The Chicago Development Company is promoting an electric railway to be constructed from Greenville to the summit of Paris Mountain; railway will be constructed provided the city of Greenville will subscribe the sum of $30,000.

Spartansburg, S. C.—The Spartansburg Electric Railway Company is considering an extension to the Saxon Cotton Mills and probably to the Whitney Mills; distance, three and six miles, respectively.

Sioux Falls, S. D.—The Sioux Falls & Sioux City Electric Railway Company will build a standard-gage line connecting Sioux Falls, Worthing, Bensford, Elk Point, S. D., and Sioux City, Ia.; distance, 90 miles; two power stations will be built, one at Sioux Falls, S. D., and the other at Sioux City; capital stock, $1,000,000.—O. H. Smith, President; E. D. Morcom, Secretary and Treasurer; Geo. W. Burnside, General Manager, and F. C. Whitehouse, Superintendent.

Jackson, Tenn.—The outlook is very favorable for an interurban electric line between Jackson and Memphis; two routes are being surveyed, one from Memphis via Covington and Brownsville, and the other via Macon and Brownsville; an Eastern syndicate is behind the matter.

Maryville, Tenn.—A deal in which the stock of the Rockford Electric Company changed hands has just been consummated at this place; stock of the company is now owned by Maj. Ben. Cunningham, Joseph Burger, James L. Clark and Ernest Koella; new owners will begin work at once on the reconstruction of its power plant at Rockford, which was burned a few weeks ago; entire electric lines of the town will be rebuilt and placed in a first-class condition, and the plant will be in full operation within the next 60 days.—J. L. Clark, Superintendent.

Fort Worth, Tex.—Citizens in Riverside are urging the construction of a street car line.

Mount Pleasant, Tex.—Contracts will be let soon for building a gasoline motor line from Mount Pleasant to Red Springs, distance 11-3 miles. M. C. Wolfe, Mount Pleasant, Promoter.

San Antonio, Tex.—The San Antonio Traction Company is considering the construction of a four-mile extension via the stock yards to Palm Garden.

Roanoke, Va.—The Roanoke Railway and Electric Company is about to begin the extension of its line through the town of Salem; new line will run to Lake Spring and will be a mile long.

Seattle, Wash.—Mayor John F. Miller has approved the franchise granted to the Seattle, Renton & Southern Railway Company for a street car line on Third avenue, between Pike and Pine streets, and Pine street, between First and Fifth avenues.

McDonald, W. Va.—The White Oak Railway will build a four mile extension; bids will be asked within the next 30 days. D. S. Dixon, McDonald, President.

Cedarburg, Wis.—The Milwaukee Northern Railway Company will double track the line in operation from Milwaukee north to Cedarburg and build a single-track branch from Cedarburg west to West Bend this year; plans call for a line from Milwaukee north to Cedarburg, where it forks, one branch extending north to Sheboygan and the other northwest via West Bend to Fon du Lac; distance, 120 miles.

BIDS RECEIVED AND CONTRACTS AWARDED

Council Bluffs, Ia.—The Iowa & Omaha Short Line Company has awarded contract for building section of proposed electric railway from Council Bluffs to Traynor, 15 miles, to George W. Adams & Company, of Walnut; grading on the remaining 115 miles will be undertaken this spring.—J. H. Mayne, Chief Engineer, Walnut, Ia.

Sunset, Okla.—Construction of the Beaver Valley & Northwestern Railroad will be commenced by the company in May; company has let contract for building railroad in Oklahoma from Gage, via Beaver, to Hooker, a distance of 104 miles, to T. E. Luttgerding, Turner Building, Wichita, Kan.; surveys are made, capital for construction and right-of-way has been obtained.—H. A. Perkins, Chief Engineer, Beaver; J. M. Kerns, General Manager, Sunset, Okla.

BRIDGES

Mobile, Ala.—The Board of Road and Revenue Commissioners will build bridge 1,280 feet long across Fowl River; plans are being prepared and bids will be invited.

Camden, Ark.—Ouachita County and city will jointly construct steel bridge over Ouachita River; cost, $50,000.—E. H. Carson, Mayor.

La Junta, Col.—Mark Denson, of Rocky Ford, is preparing plans for a bridge over King Arrow.—R. C. Todd, County Clerk.

Washington, D. C.—Senator Elkins has introduced a bill directing the District Commissioners to have made plans and estimates for a bridge across the eastern branch of the Potomac River, on line of Massachusetts avenue extended; appropriation, $3,500.

Atkinson, Ga.—Bids are being asked for construction of steel bridge across Great Satillo River at Ammons Ferry, near Atkinson; total length, 344 feet.—Ira M. Raybon, Clerk Superior Court, Jesup, Ga.

Geneseo, Ill.—Plans are being prepared by State Highway Engineer A. N. Johnson, Springfield, Ill., for the construction of two steel bridges, 60 feet span and 16 feet roadway, in Geneseo Township.—Bert Bradley, Clerk Geneseo.

Joliet, Ill.—Mayor Cronin has appointed Committee to meet with the Highway Commissioners for the purpose of discussing the proposition to replace stone bridges at Richards and South Chicago streets, over Hickery Creek.—Alex. G. Barrett, Chairman; Roger G. McGrath, Secretary.

Crown Point, Ind.—Lake County will receive bids March 27 for the sale of $37,500 of bridge bonds.—Chas. A. Johnson, Auditor.

Sioux City, Ia.—Work on the Wall street viaduct will begin as soon as frost is out of the ground; cost, $200,000.

Ft. Scott, Kan.—Bourbon County Board of Commissioners will let contract for constructing bridges about Aug. 1.—C. E. Holstein, County Clerk.

Ft. Scott, Kan.—Plans are being prepared by City Engineer R. L. Stroude for

twenty 9-foot span reinforced concrete culverts.—J. O. Brown, City Clerk.

Hutchinson, Kan.—Council is considering the construction of a bridge at Avenue A; cost, $30,000.

Independence, Ky.—Kenton County Fiscal Court will reconstruct the De Coursey Bridge over Banklick Creek; cost, about $20,000.

Boston, Mass.—The Committee on Roads and Bridges is considering plans for the Neponset bridge.

Leominster, Mass.—The N. Y., N. H. & Hartford Railroad has instructed Engineer Hodges to prepare plans for three steel bridges in connection with the abolition of grade crossings.

St. Paul, Minn.—City Engineer L. W. Rundlett has estimated the cost for the construction of a steel extension to the East Third Street Bridge at $50,000 to $55,000.

Tylertown, Miss.—Through the efforts of Supervisor J. L. Yarborough, of the Second District, the people of Tylertown will be supplied a long-felt want in the new steel bridge which will span Magee's Creek; Supervisors have adopted the plans and specifications and advertised for bidders for the construction; approaches to the bridge will be sixty feet from the east and 120 feet from the west, the iron or steel portion of the structure being 75 feet.

Avilla, Mo.—Jasper County has selected Engineer William Kohlman, Carthage, Mo., to prepare plans for a reinforced concrete bridge, with 76-foot span and 16-foot roadway.—L. L. Ashcroft, County Clerk, Carthage.

Carthage, Mo.—Jasper County Court has selected County Engineer William Kohlman to prepare plans for a concrete bridge to be constructed over White Oak Creek near Avilla.

Joplin, Mo.—Plans are being prepared by City Engineer J. B. Hodgdon for six concrete culverts; cost, $5,500.—Hiram Phillips, City Clerk.

Kansas City, Mo.—An agreement to build the Lydia avenue viaduct has been reached by the representatives of the Chicago & Alton and the Missouri Pacific Railway companies and the Metropolitan Street Railway Company; plans for the structure, that is to cost $77,760, are to be prepared at once and contracts let that the work may be started within a month; the agreement provides that the Missouri Pacific Railway Company and the Metropolitan Street Railway Company are each to pay two-sevenths of the cost, and the Chicago & Alton Railway Company the remaining three-sevenths.

Springfield, Mo.—Greene County has instructed Engineer Fred J. Marshall to prepare plans for two steel bridges.—W. B. Cloud, County Clerk.

Passaic, N. J.—The County Engineer has estimated the cost of constructing a drawbridge at Second street at $85,000 to $90,000 and a structure at Eighth street at about $55,000.

Seneca Falls, N. Y.—An engineering force employed by the Genesee, Waterloo, Seneca Falls & Cayuga Park Electric Railroad is now engaged in making soundings across Cayuga Lake, from the Bridgeport shore, on this side of the lake, to the Cayuga shore, for the purpose of getting data for plans for the bridge the company proposes to build; bridge will be about two miles in length.

Columbus, O.—The report of City Engineer Henry Maetzel on the cost of constructing a viaduct over the railroad tracks connecting Third and Summit streets has been filed with the Board of Public Service; estimated cost is, in round numbers, $900,000, of which amount $738,978 would be for the viaduct and approaches and $160,000 is for land for the Summit street approaches.

Coshocton, O.—Coshocton County will receive bids March 5, noon, for the purchase of $183,000 Muskingum River bridge bonds; also $142,000 Tuscarawas River bridge bonds.—Benton Davis, President Commissioners; C. R. Randles, Auditor.

Dayton, O.—Bids will be again received by the Board of Commissioners for the construction of the Needmore bridge, across Needmore road.

Portland, Ore.—Ordinances have been passed providing for the submission of the proposed bill for the erection of a high bridge of the bascule type across the Willamette from Broadway street to Sixth and Glisan streets to a vote of the people at the primary election to be held May 7; plans for the proposed Broadway bridge are those outlined by Civil Engineer Ralph Modjeska.

Portland, Ore.—The Joint Committee of the Legislatures of Washington and Oregon on the linking of these States by a mammoth bridge from Vancouver to the Peninsula has recommended that each State appropriate $5,000, the $10,000 to be used to pay the services of an engineer to make the drawings, ascertain soundings and complete other necessary preliminaries to the important project; Ralph Modjeska has been suggested, inasmuch as he has already done a great deal of such work in this vicinity; $2,000,000 to $2,500,000 will be required to complete the structure.

Allentown, Pa.—City Engineer Weirbach is preparing plans for the construction of a steel bridge on Hamilton street; cost, about $13,000.

Olneyville, R. I.—Citizens are urging the widening of the bridge over the N. Y., N. H. & R. R. R. tracks at Union street.—Alderman G. R. Parker.

Camden, S. C.—Kershaw County is considering the erection of steel bridge over Wateree River.—M. C. West, Supervisor Kershaw County, Camden.

Knoxville, Tenn.—Bids will be received March 16 for $50,000 4½ per cent. 30-year viaduct bonds.

Brady, Tex.—Council will soon close a contract for a 50-foot concrete bridge across Brady Creek in North Brady; iron span now doing service will be moved several blocks higher up the creek and put up at another public crossing.

Denison, Tex.—An immense viaduct will be built to connect Southeast Denison with the business portion proper; structure will be sufficient to accommodate vehicles and foot traffic; cost, $30,000.

Hearne, Tex.—Mayor P. L. Brady, Dr. H. W. Cummings, W. A. Wilkerson and C. L. Dillard have been circulating a subscription list raising funds for the bridge that the Hearne merchants want across the Big Brazos River; cost, $4,000.

Hondo, Tex.—Citizens in Medina County will vote April 6 on $40,000 bridge and road bond issue.

Weatherford, Tex.—Engineer E. Werenskiold, Dallas, Tex., is preparing plans for a bridge across Town Creek, on North Main street; estimated to cost from $6,000 to $8,000; specifications will be ready for bids about April 1.—H. L. Moseley, Mayor.

Norfolk, Va.—A $9,000 appropriation has been made for the bridge and abutments to be constructed over Mahone Canal on Lake avenue.

Marietta, Wash.—The Board of County Commissioners is considering the construction of a bridge over the Nooksack River; probable cost, $20,000.

BIDS RECEIVED AND CONTRACTS AWARDED

Beardstown, Ill.—J. H. James, of Monmouth, has been awarded contract, at $3,674, for construction of a 180-foot steel bridge over the Sangamon River for the county; work is to be started about May 1.

Chicago, Ill.—Contract for reinforcing and repairing Van Buren street bridge has been awarded to Geo. W. Jackson, Inc., 169 West Jackson street, for $8,131.

Paducah, Ky.—George F. Weikel has been awarded contract at $4,928, for constructing a 390-foot long, 7-foot in circumference brick culvert for the city.

Terrebonne, Minn.—The Hennepin Bridge Company, of Minneapolis, has been awarded contract, at $4,100, for constructing a 150-foot steel bridge over the Clearwater River.

Waseca, Minn.—Contract for the construction and repair of various bridges throughout the county has been awarded to A. Y. Bayne & Company, of Minneapolis, at $4,835; the contract requires the construction of five new bridges and repairs to three old bridges.—Theodore Peterson, County Auditor.

Flemington, N. J.—Contract for building four concrete culverts and bridges, approximate quantity concrete 295 cu. yd., on the second section of the White House-Flemington Road, was awarded on Feb. 18 to Van Keuren & Son, of Jersey City, for $2,675.—Grant Davis, of White House Station, Engineer of Hunterdon County.

Syracuse, N. Y.—Two bids for a gasoline runabout automobile for the police bureau will be rejected. John R. Walsh was the lowest bidder for furnishing and installing plumbing in the new truant school. He bid $300.

The Burroughs Adding Machine Co. bid $450 for a machine for the City Treasurer.

Minot, N. D.—The following bids were received, February 4, by the County Commissioners for constructing a steel bridge on Bleyea avenue: McDougall & Son, $5,700; Central States Bridge Company, Indianapolis, $5,744; Fargo Bridge & Iron Works, $6,300; A. Y. Bayne & Company, Minneapolis, $6,200; Security Bridge Company, Minneapolis, $6,000; Minneapolis Steel Machinery Company, $5,740; Cook Construction Company, Des Moines, concrete bridge, $12,926; George W. Kemper, $7,400. Contract for constructing bridge has been awarded to Neil McDougall & Son, city, for $5,700.—J. W. Fabrick, County Auditor.

Addyston, O.—The County Commissioners have awarded contracts for building a new concrete bridge over Muddy Creek road at Addyston to the Robertson Construction Company, at $7,440.

Cleveland, O.—A. P. Lagron was awarded the contract, February 11, for the construction of the bridge to be placed over the Baltimore & Ohio R. R. tracks at the foot of Clark street, at about $150,000; the contract includes all the work except the erection of the iron structure; there is a large fill, besides the erection of the concrete abutments and piers.

Dayton, O.—The contract awarded to the Brookville Bridge Company, subject to ratification by the Prosecuting Attorney, may be partially revoked as the result of an alleged technical error; the award was made for the construction of the Needmore road bridge at a cost of $16,300. In bidding, the bridge company offered to build the superstructure for $10,900 and the whole bridge for $16,300. No separate proposal was made for the building of the substructure and legal authorities claim this circumstance makes the contract defective in part. The contract has been submitted to Prosecuting Attorney Lenz and should it be found erroneous new bids will be advertised for and the contract for the substructure reawarded.

Gitzinger Bros., at $3,412.64, were lowest bidders for repairing the planking of the roadway of the Fifth street bridge.

Williamsport, Pa.—The County Commissioners, Feb. 24, opened bids for steel stringers and lumber for two bridges at English Center. The Nelson Merydith Co., of Chambersburg, got the steel stringer contract at their bid of $789. The contract for oak lumber was awarded to E. B. Ayres, of White Pine, at $23 a thousand, he being the lowest bidder.

Lynchburg, Va.—Bids were received as follows, February 15, by the Joint Committee on Streets and Sewers for the construction of a reinforced concrete viaduct at Fifth street: Stewart Contracting Company, $47,928; A. W. McClay, $55,949; Lane Bros. Company, $52,785; H. B. Odell, $52,856; Ohio Concrete Company, $50,549; H. J. Collier Company, $57,838; Lafferty & Weir, $49,557; Carolina Engineering Company, $57,414; MacArthur Bros. Company, $61,862; William Tunny, $44,631; Tiffany & Gailt, $60,025; Scott Bros., $47,907; Stanford Bros. & Ragland and E. T. D. Myers, $51,840; Curtis & Shumway, $51,134; R. M. Bibb, $59,036; John Ginder, $66,050; B. B. McGhee & Company, $47,779; Thiele Construction Company, $56,834; Jones & Adams, $51,914; Geanor & Caruthers, $47,163; R. J. Malone, Lynchburg, $41,129; Mathews-Curtis Company, $60,554; Wisley & Brawley, $49,588; A. D. O'Brien, $65,593; E. G. Nave Bros. Company, $49,979; Hall Craner Company, $59,963; Norcross & Edmonds, $44,217; W. W. Lindsay & Company, $49,880; Alsop & Pierce, $50,768; Jenks & Dresser, $48,995; G. B. Pennington, $45,043.—H. L. Shaner, City Engineer.

Tacoma, Wash.—Bids were received as follows, February 4, by the County Comsioners for the reconstruction of the Mashel River bridge on the Mount Tacoma-Canyon Road: Northwest Bridge Company, $3,950; F. W. Stater, $3,994; Coast Contracting Company, $4,100; Joseph Wells, $4,220.

Montesano, Wyo.—The contract for constructing a steel bridge over the Humptulips River has been awarded by the County Commissioners to Charles C. Sheeley, McPhee Building, Denver, Col., at $5,360, for the steel span and $3.40 per linear foot for the approaches.

MISCELLANEOUS

Florence, Ala.—H. B. Austin, Florence, Ala., is considering purchase of a concrete block machine.

Mobile, Ala.—Engineer Smith will purchase 500 oak trees.

Warren, Ark.—City is considering erection of library building.

Berkeley, Cal.—After months of deliberation on the part of the Berkeley Board of Town Trustees, that body has authorized the purchase of seven acres of land lying between Third and Harrison streets, Codornices Creek and the slough, for a site upon which to construct a municipal incinerator; purchase price is to be $15,000.

Rockville, Conn.—Plans and specifications are now being prepared for a stone embankment wall; work to be done under supervision of J. T. McKnight, Engineer of Department of Public Works; cost, about $5,000.—David Horgan, Chairman Board Public Works.

Washington, D. C.—Captain Piper will superintendend the construction of a one-story crematory to replace the one destroyed by fire.—Jas. M. Wood, Superintendent Street Cleaning.

Albany, Ga.—Council has accepted plans by Robinson & Reidy, of Savannah, Ga., for City Hall; bids will soon be advertised.

Fort Wayne, Ind.—Conditions satisfac-

tory to Guy Colerick, City Attorney of Ft. Wayne; James M. Barrett, Attorney for the Ft. Wayne & Wabash Valley Traction Company, and Representative Shirley, who introduced a bill to give the Board of Works power to clean the three rivers which cut through that city and to beautify their banks, were agreed on in a meeting of the House Cities and Towns Committee, and the bill has been prepared for reporting it back for passage.

Fort Wayne, Ind.—If the city authorities consent, Hayden Park, on East Jefferson street, may be utilized as a public playground for the children, according to the plans of the Playground Association of Fort Wayne.

Indianapolis, Ind.—Lew W. Cooper, Chairman of the Board of Public Safety, and the Finance Committee are considering ordinances appropriating money for police substations and for buying additional sites for engine houses for the Fire Department.

South Bend, Ind.—If recommendations made by Herman H. Beyer, Superintendent of Parks, are favorably received by the Board of Public Works, South Bend will witness greater activity in park improvement this spring than ever before; Superintendent Beyer has made extensive plans for putting the new parks into commission and for a larger and modern animal building and a great palm house at Leeper Park; prospects for public bathing places in the river are also bright.

Council Bluffs, Ia.—Council is considering the purchase of property at the corner of Broadway and Seventh avenue as a site for a new City Hall.

Des Moines, Ia.—C. R. Keyes, backed by a company with $20,000,000 capital, has asked Council for a 25-year franchise for an elevated and interurban terminal company which proposes to furnish terminal facilities for several interurbans headed this way and an elevated service for the city.

Marion Station, Md.—W. C. Gunby will purchase a machine for grinding oyster shells.

Boston, Mass.—The Boston-Schub Construction Company, Motor Mart, Boston, Mass, will soon purchase concrete mixers. —W. A. Shafer, President.

Gloucester, Mass.—The Park Commissioners have decided to send a communication to Council recommending an appropriation for several long-felt needs, and another for $1,000 for levelling the sand bank on the north side of the canal.

Gloucester, Mass.—The Park Commissioners have recommended plans for a comfort station.

Holyoke, Mass.—The Board of Aldermen has authorized a $5,000 public park loan; a new park will be established in Elmwood.

Lawrence, Mass.—The Board of Trade is considering the erection of a new City Hall. —Secretary Littlefield.

Lowell, Mass.—The Park Commission has ordered the appointment of a topographical commission to study the development of Lowell for the next 50 years, with a view to establishment of a system of parks, squares, commons and drives.

Malden, Mass.—Council has adopted resolutions opposing the proposed extension of the Boston Elevated's overhead line east of the Saugus branch tracks and favoring a location west of the tracks.

Detroit, Mich.—Council has directed the Department of Public Works to advertise for proposals for improving the Eastern Vegetable Market.

Indianola, Miss.—City has accepted plans by Huston & Cunningham, 725 Maison Blanche Bldg., New Orleans, La., for City Hall.

St. Joseph, Mo.—City will erect Carnegie library; cost, $25,000.

St. Louis, Mo.—City will expend $10,000 in cleaning the River Des Peres for a distance of eight miles; river will be put in a 20x30-foot sewer; work will take three years.

Atlantic City, N. J.—Members of the Finance Board of the Council and representatives of the Hotel and the Business Men's Leagues are discussing the details of the proposed bill to be introduced at Trenton to allow the municipality to issue bonds for building a convention hall.

Perth Amboy, N. J.—Mayor Bollschweiler, Alderman-at-Large Voorhees, Alderman Gannon and Street Commissioner Adair have inspected the Second and First street dumping grounds and say that conditions are as bad as described by residents in that vicinity; result of their visit brought out the fact that this city will have to look for grounds for an incinerating plant.

Albany, N. Y.—The Attorney-General has decided that the Canal Board can legally enter into a contract to divide the canal work into mile sections and have these turned over to the State as the separate sections are completed, releasing the contractor from maintaining them; opinion particularly affects Contract 20, which has been advertised four times without being awarded, one of the reasons stated for the failure to receive satisfactory bids being the uncertainty attached to the cost of maintaining the work after its completion.

Buffalo, N. Y.—The Board of Aldermen has asked for an appropriation of $15,000 to be given to the Department of Public Works; whole amount to be used, if necessary, in clearing the snow from the streets, opening the gutters and receivers and letting the water away.

Buffalo, N. Y.—The Board of Aldermen are considering a $15,000 bond issue for the cleaning of streets.

Lockport, N. Y.—The Committee on Streets of the Council has decided to recommend to the Council that the City Clerk be authorized to advertise for bids for the street cleaning contract; Committee may decide to call for bids for one, two, three, four and five years, believing that if a five-year contract is awarded that competition can be secured.

New York, N. Y.—Architect Theo. E. Videto has been selected to prepare plans for a $40,000 public comfort station for the Department of Parks.

Watertown, N. Y.—The Board of Supervisors will call for bids about May 1 for a $100,000 jail building.—O. D. Greene, Jr., Architect, Adams.

Kinston, N. C.—City is considering an election on $75,000 bonds for erection of market house.

Lemon Springs, N. C.—W. F. Edwards is considering the manufacture of clay or concrete drain tile and purchase on machinery.

Cincinnati, O.—An ordinance has been passed authorizing the Park Commission to expend $20,000 to erect a shelter and a bath house in Sinton Park.

Columbus, O.—The Board of Public Service has selected F. F. Scattergood to assist in preparing plans for the new city garbage disposal plant; estimated cost, between $150,000 and $170,000.—E. W. Hirsch, Secretary.

Dayton, O.—Bids will be received March 29, noon, for $35,000 bonds for erection of a market house.

Marion, O.—Bids will be received March 12 for the purchase of $3,100 of 4 per cent. bonds.—H. S. Elliott, City Auditor.

Ardmore, Okla.—An election will be held March 23, on $15,000 park bonds.

Holdenville, Okla.—Citizens have voted $110,000 bonds for the erection of a City Hall, installation of a sewer system and extension of water works.

Portland, Ore.—City will have a garbage crematory of its own, costing $150,000 and located by the Board of Health, if a petition circulated by Thomas Scott Brooke and extensively signed avails; petition is now in the hands of Councilman Cellars, who will bring it before Council.

Portland, Ore.—Council has adopted a resolution providing for $150,000 bond issue for the construction of crematories and providing for a garbage collection system; an election will be held soon.

Beaver, Pa.—Citizens will vote April 12 on $15,000 bonds for erection of a municipal building.

Dubois, Pa.—Health Officer Nicholson has about completed plans by which he hopes to still further improve the sanitation of the town; Mr. Nicholson will build a garbage plant of his own and have wagons make house to house collections of waste materials twice per week.

Easton, Pa.—Citizens have voted $45,000 for a garbage disposal plant.

New Castle, Pa.—All the bids for the collection and disposal of garbage for the next three years have been rejected by Councils, and new bids will be asked for at once; George H. Van Horn, of this city, was the lowest bidder for the contract at $11,960 per year for three years.

Philadelphia, Pa.—Chief Eisenhower, of the Bureau of City Property, has urged the extension of the playground system.

Philadelphia, Pa.—Extensive improvements are contemplated for both the Delaware and Schuylkill Rivers, should the city obtain aid from the State for dredging the channels and further widening Delaware avenue; two bids, providing either $1,500,000 or $500,000 for this work, are under consideration by the Legislature, and Mayor Reyburn has promised that the city will at least provide an additional $500,000; the erection of bulkheads and piers and the widening of Delaware avenue as far as League Island is under consideration.

Spartanburg, S. C.—In honor of the centenary of the coming of Jesse Cleveland to Spartanburg, the heirs of the deceased will erect in the center of Main street, opposite the Spartan Inn, a handsome drinking fountain, upon one side of which will be a slab commemorating the deceased.

Brownsville, Tenn.—The Civic League has donated a public drinking fountain to the town and will have it put in the Court House yard at an early date.

Chattanooga, Tenn.—Spencer S. Marsh, Northern Hotel, is desirous of communicating with manufacturers of machinery for reducing or crushing iron ore to powder.

Memphis, Tenn.—Wirt J. Wills, Chairman of the Water Commission, is planning to add another park to the many which now serve to beautify the city; new pumping station and reservoir on Tanglewood avenue comprises between three and four acres, and if it could be improved with the planting of trees, shrubbery and flowers would make a beautiful little park.

Nashville, Tenn.—The Council's Committee to select a suitable site for children's playgrounds in South Nashville and Northeast Nashville will recommend to the Park Commission the establishment of the parks; the South Nashville lot recommended and selected by Councilman Marlin is on Third avenue, a few feet below Chestnut street; the Northeast Nashville lot was selected by Councilman Ehrhart and is an ideal location at are southeast corner of Grace avenue and Meridian street.

El Paso, Tex.—Hering & Fuller, New York, have prepared plans for proposed garbage and sewage disposal plant; cost, $125,000.—Percy McGhee, City Clerk.

Paris, Tex.—Council has ordered an election to determine whether $65,000 of bonds shall be issued for the following purposes: For enlarging and improving the City Hall, $10,000; for installing a filtration plant at the water works lake, $10,000; for constructing an abattoir at offal reduction plant, $10,000; for street paving, $25,000.

Norfolk, Va.—Councilman A. C. Omohundro has submitted figures and plans to the City Hall Committee which, if effected, will insure a $1,000,000 municipal building at the corner of Granby and Queen streets.

Georgetown, Wash.—Plans for a new City Hall and fire station have been approved by Council; bids have been ordered advertised and it is the intention of the builders to have the new edifice erected by June 1.

Seattle, Wash.—Mayor John F. Miller has approved the appropriation of $15,000 for the purchase of block 5, Joseph C. Kinnear's Addition to Seattle, to be used by the Board of Park Commissioners for playground purposes.

Spokane, Wash.—The new $70,000 issue of crematory bonds for Spokane has been assigned to the Harris Trust & Savings Bank, of Chicago.

BIDS RECEIVED AND CONTRACTS AWARDED

Sacramento, Cal.—Bids for the new City Hall were opened by the Board of Trustees February 16; two bids were put in by each contractor—one for building the structure with pressed brick, terra cotta and granite and the second for a granite facing over the entire structure. The lowest bid for pressed brick, terra cotta and granite was that of the Thompson-Sterritt Company, of San Francisco. Its figure was $173,900. The lowest bid for all granite was that of P. J. Lynch, of San Francisco. His figure was $245,552. The bids were all referred to the Building Committee of the Board, of which Trustee Rider is Chairman.

The bids were as follows: (a) Pressed brick, terra cotta and granite; (b) all granite facing; (c) extra for all granite. Thompson, Sterritt Company, (a) $173,900, (b) $259,900, (c) $86,000; J. C. Mathews, (a) $174,750, (b) 295,000, (c) 120,250; P. J. Lynch, (a) $177,840, (b) $245,552, (c) $67,712; Rikon, Ehrhardt Company, (a) $177,900, (b) $263,900, (c) 86,000; Ransome Construction Company, (a) $179,947, (b) 252,947, (c) $73,000; McGillivray Construction Company, (a) $181,928, (b) $275,000, (c) $94,072; Adolph Tiechert, (a) $188,450, (b) no bid; Kopp Bros., (a) $188,566, (b) no bid; Clark & Henery, (a) $188,800, (b) $282,800, (c) $94,000; Healy, Tebbits Company, (a) $194,900, (b) $290,000, (c) 95,100; Siller Bros., (a) $200,993, (b) $315,369, (c) $114,376; Cotton Bros. Company, (a) $206,000, (b) $298,000, (c) $92,000.

Newton, Ia.—Rawson & Co., of Iowa City, have landed the contract to build the new Jasper County Court House; their bid was $130,850, and there were 24 other bidders, whose figures ranged all the way from the Rawson price to $164,000, the next lowest being $28 above that of the Rawsons. The dimensions of the Court House will be 90x125 feet, two stories and a basement; Bedford stone will be used, and a stone dome will top the building; work is to begin as soon as the weather permits. The firm is composed of James Rawson, Oscar Lutz and Charles Franklin.

Oelwein, Ia.—Contract for erecting City Hall has been awarded to Donald Ross, city, for $14,921. Harry E. Netcott, Independence, Architect.—C. D. Shippey, City Clerk.

Leesville, La.—A contract was signed up

February 18 between the Police Jury of Vernon Parish and the H. B. Hull Construction Company, of Jackson, Miss., for the construction of a Court House building to cost $57,685.

New Orleans, La.—For Towing and Pumping Garbage Boats.—Daniel Mangor, for towing, bid $20 per boat, pumping $7.50 per hour; J. A. Bisso, towing, $15 per boat, pumping, $5 per hour; J. D. Martinez, towing, $7.50, pumping $4 per hour.

Boston, Mass.—Bernard E. Grant, of 26 Derne street, West End, has been awarded a contract by Superintendent of Streets Emerson for furnishing the Street Department with single and double teams and men for the East Boston, Breed's Island, Charlestown, North End, West End and the Back Bay. For the East Boston, Breed's Island and Charlestown districts Grant will receive $4.85 a day for double teams, $3 a day for single teams and $2 a day for extra men, while the price for the North and West Ends and Back Bay are $4.50 for double teams, $3.05 for single teams, and $1.85 for extra men. Other contracts awarded were:

Thomas F. Lynch, of 10 Washburn street, Dorchester, double teams for $5 a day, single teams for $2.80 a day and extra men for $2 a day in the Dorchester district.

Clark & Shea, at 219 Weston avenue, Brighton, double teams, $4.75 a day, single teams, $2.75 a day, and extra men $2 a day in the Brighton district.

Joseph Spriller, of 328 Longwood avenue, Roxbury, double teams, $4.45 a day, single teams, $2.90 a day, and extra men, $2 a day in the Roxbury district.

Minneapolis, Minn.—Bids were received by the Board of Public Works, February 12, for furnishing (A) 40,000 barrels Portland cement for street work; and 10,000 barrels Portland cement, and (B) 5,000 barrels natural cement for sewer work. Andrew Rinker is City Engineer; H. M. Knott is City Clerk:

(A)—Sandusky Portland Cement Company, Sandusky, $1.26 per barrel; Universal Portland Cement Company, Chicago, $1.20; Menomonie Hydraulic Pressed Brick Company, Minneapolis, $1.20; Superior Manufacturing Company, Minneapolis, $1.21; Landers, Morrison, Christenson & Co., Minneapolis, $1.20; Northwestern Lime Company, St. Paul, Minn., $1.15.

(B)—Menomonie Hydraulic Pressed Brick Company, Minneapolis, 59 cents; Landers, Morrison, Christenson & Co., Minneapolis, 57 cents; 10,000 barrels Portland cement f. o. b.: Northwestern Lime Company, St. Paul, Minn., $1.15; Landers, Morrison, Christenson & Co., Minneapolis, $1.20; Superior Manufacturing Company, Minneapolis, $1.21; Menomonie Hydraulic Pressed Brick Company, Minneapolis, $1.20; Universal Portland Cement Company, Chicago, $120; Union Railway Storage Company, Minneapolis, $1.20.

Rochester, N. Y.—The Board of Supervisors of Monroe County received the following bids for cellar and steel construction of the county jail: Van Dorn Iron Works Co., Cleveland, O., $18,000; Pauly Jail Building Co., New York and Chicago, $24,660; Champion Iron Co., Kenton, O., $22,922; Stewart Jail Works Co., Cincinnati, O., $28,150.

For mason and carpenter work the following bids were received: Gorsline & Swan Construction Co., Rochester, $12,552; N. N. Edgerton, Rochester, $14,115; Edward Strauchen, Rochester, $14,931; George Kircher, Rochester, $13,550; A. Friederich & Sons Co., Rochester, $12,787; Henry Oberleis Sons, Rochester, $13,840; F. N. Rapp & Co., Rochester, $17,449; Geo. B. Garrison, Rochester, $14,764; Anthony Link, Rochester, Rochester, $13,800.

Dayton, O.—The Servers have awarded the contract for the work house labor to the Cincinnati Manufacturing Company for another year. City Solicitor Burnham reported that the Board had the power to award the contract until January 1 of next year, and recommended the contract be awarded at the company's bid, 25 cents per day per prisoner.

Toledo, O.—The Board of Park Commissioners, having received bids some time ago for automobiles, has purchased a fine $4,000 Pope-Toledo car for $2,000.

Youngstown, O.—The Building Commission of the new County Court House and Jail has awarded contracts as follows: Heller Bros. Company, city, mason work alternate D, Indiana limestone, $70,809; roofing, $1,144; painting, $770; ash hoist, $390; carpenter work, $10,682; lathe and plastering, $1,341. Champion Iron Works Company, of Kenton, cell work, alternate E, $35,641; dumb waiters, $1,250. Dean & Havens, of Olean, N. Y., proposition No. 2, heating, $19,446; plumbing, $18,970. Electric Wiring Company, city, electric wiring, $1,269.60.

Wilkes-Barre, Pa.—Six dealers in automobiles submitted bids in line with an advertisement by the County Commissioners. The bids follow: V. A. Hook & Son—One 5-passenger Cadillac 30-horsepower for f. o. b. cars Wilkes-Barre, $1,596.50; Coward & Long, Scranton Automobile Co.—One Model "F" Thomas Flyer, 60 horsepower, 7-passenger, 4-cylinder, fully equipped with top and glass, f. o. b. Wilkes-Barre, $4,500; one 50-50-horsepower passenger Knox car, $1,500; one Chalmers Detroit, "40," $300. Wyoming Valley Motor Car Co., C. L. Davis, Manager—One Type 1, 40-horsepower locomobile, 7 pasenger, f. o. b. Wilkes-Barre, $4,500; one Model "17," 5-passenger Buick, $1,850. Matheson Motor Car Co.—One 7-passenger, 35-horsepower, 1907 type, $2,500; one 7-passenger, 50-horsepower, 1908 type, second-hand, $4,000; one 7-passenger, 50-horsepower, 1909 type, $4,650; one 5-passenger, 50-horsepower, 1909 type, $3,150. Adam Eldam, Hazleton, Pa.—5-passenger Franklin, 28 horsepower, 5-cylinder, $2,936.50; 7-passenger Franklin, 42-horsepower, 6-cylinder, $3,886.50. National Harvester Co. of America—Two-seated, 15-horsepower automobile, $700.

Redfield, S. D.—Contract for County Jail has been awarded to John H. Mork, city, for $18,069, complete. Other bidders on this work were: The Bailey-Marsh Company, Minneapolis, Minn., and Stolte & Miencier, Redfield, S. D., with bids of $19,176 and $20,323 respectively. W. J. Bingham, County Auditor.

PATENT CLAIMS

912,318. Reinforced Concrete Pipe Structure. Harry R. McMahon, Cleveland, O. Serial No. 379,161.

In a reinforced concrete pipe structure, the combination with two contiguous pipe sections, each having an inner and an outer cylindrical reinforced member, each made of wire fabric embedded in their respective shells; the end of one section overlapping and secured to the end of the other; the one outer reinforcing member projecting into and embedded in such overlapping portion of its corresponding section and the inner reinforcing member of the other section projecting into and embedded in the overlapped portion of the other section.

912,383. Water Meter. Albert H. Kennedy and Clarence H. Kennedy, Rockport, Ind. Serial No. 427,602.

The combination, of a meter having projections through which the inlet and outlet openings pass, a coupling block coupled to the service pipes and having openings to receive the aforesaid projections, and means for clamping the block and projections together.

912,428. Block for Sewer Construction. Charles H. Slocomb, Hartford, Conn. Serial No. 303,260.

A block for sewer construction having sloping side walls and top and bottom faces curved laterally of the block and with a projecting top at one end and a projecting bottom at the opposite end, each of said projections extending the full width of the block and with interlocking means on the sides.

912,478. Surface Street or Road Railway for Automobiles and Other Vehicles. Madison Maginn, Chicago, Ill. Serial No. 334,729.

In a surface street or road railway, the combination of, a rail support and foundation, formed of plastic material, arranged longitudinally with the rails of a railway, rails arranged upon the top of the plastic structure, anchor plates fitted to said structure, splicing plates securing the ends of the rails, bolts securing the rails, splice plates, and anchor fastenings to the rail support, substantially as and for the purposes specified.

912,521. Incinerator. Gabriel Allen, Los Angeles, Cal., assignor of one-half to Timothy Carroll, Anaheim, Cal. Serial No. 320,295.

An incinerator comprising a casing having a chamber, a fire grate and a plurality of baskets in the chamber, said baskets being formed of pipes and arranged to hold moisture-containing products in suspension above the grate, and being spaced apart and separate fro meach other with an open space between them at their tops and diverging downwardly to provide a passage way from said open space to the fire grate; means for supplying water to the pipes of said baskets; said casing being provided with openings arranged alongside each other above said baskets and above said passage between the baskets respectively and communicating with the chamber, part of said openings being arranged to allow moisture-containing products to fall therethrough into the baskets, and another of said openings being in the open space between the baskets to allow dry refuse to fall through said passage directly onto the fire grate without contacting with either garbage-supporting grate.

912,638. Culvert Pipe. Carl O. Wold, Minneapolis, Minn. Serial No. 459,057.

The combination, with two pipe sections, placed end to end, but without lapping by one another, each section having annular corrugations formed therein, extending at intervals from end to end of the sections, of a circular band, arranged to inclose the joint at the abutting ends of said sections and also having corrugations on each side of its middle line, which are adapted to nest with and embrace the end corrugation of said pipe sections, thereby preventing separation of said sections, the corrugations in said band corresponding to those in said sections and the diameter of said band when its ends are brought together, corresponding substantially to the diameter of said sections, and means for drawing the ends of said band together to clamp it on the joint.

912,885. Reinforced-Concrete Water Pipe or Conduit. John M. Phelan, Jackson, Mich., assignor to The Reinforced Concrete Pipe Company, Jackson, Mich., a Corporation of Ohio. Serial No. 327,357.

In a pipe of the kind described a tube, a plurality of inwardly and outwardly extending sectional, telescoping ties carried by said tube, and inner and outer layers of concrete applied to the tubes and covering the said ties.

912,898. Street Pavement or Roadway. August E. Schutte, Boston, Mass. Serial No. 258,697.

A wearing surface in a pavement or roadway composed of wearing and filling stones, the ratio of the weight of each filling stone to the weight of each wearing stone being approximately as 1:50, the wearing stones being in contact with each other, the smaller stones serving as keys to the larger stones, and the whole being mixed with a bituminous cement as, described.

912,937. Ditch-Digging Machine. George W. Cowgill, Phoenix, Ariz., administrator of James Embleton, deceased. Serial No. 429,761.

A ditch-digging machine comprising a wheeled frame, propelling means mounted on the frame and connected with the propelling wheels, an excavating mechanism mounted on the frame and connected with the propelling wheels, said excavating mechanism consisting of a shaft journaled on the frame, another shaft, means adapted to support said other shaft on the shaft journaled on the frame, wheels mounted upon the shaft, a chain mounted on the wheels, scoops secured to the chain, teeth secured to the chain, a rock shaft journaled on the frame, a connection between the rock shaft and said means, and a lever secured to the rock shaft.

INCORPORATIONS

American Engineering Company, Jersey City, N. J.; capital, $250,000. Incorporators: Eugen Lazarovich Hrebelianovich, Eleanor Lazarovich Hrebelianovich and Charles L. Atterbury.

Chickasha Gas & Electric Light Company, Chickasha, Okla.; capital, $175,000. Incorporators: Lawrence Martin, Dennis O'Brien, A. A. Humphrey and C. E. Ross.

England Artesian Well Company, England, Ark.; capital, $10,000. Incorporators: J. E. Hicks, President; R. J. Langford, Secretary.

General Construction Company, Harrisonburg, Va.; capital, $10,000. Incorporators: J. S. Fravel, President; J. P. Burke, Vice-President; J. S. Heatwole, Secretary.

Interstate Construction Company, Greensboro, N. C.. Incorporators: F. B. Ricks, F. C. Boyles, Ernest Clapp and others.

George Long Contracting Company, Baltimore, Md.; capital, $5,000. Incorporators: George Long, 205 First avenue east; Conrad Long, 6 First avenue east, and Mary Long, all of Baltimore.

Maryland Construction & Development Company, Baltimore, Md.; capital, $50,000. Incorporators: Daniel F. Reisenweber, 537 North Chester street; Jacob A. Frederick, Clarence W. Gould and others.

Missouri Electric, Gas & Water Company, Jefferson City, Mo.; capital, $50,000. Incorporators: Harry B. Tyson, Joseph Barbo, W. W. Goodall and others.

Paintsville Water & Light Company, Paintsville, Ky.; capital, $300,000. Incorporators: Edwin D. Land, L. D. Brooks, Martin Garnet, all of Philadelphia, Pa.

Palmer Contracting Company, Augusta, Ga.; capital, $5,000. Incorporators: L. E. Palmer, E. F. Magruder and Julian Zachry.

Ramapo Trap Rock Company, Ramapo, N. Y.; general contractors; capital, $25,000. Incorporators: Henry W. Behrens, E. M. Hogan, William F. Peterson, Suffern, N. Y.

Wallkill Contracting Company, New Paltz, N. Y.; general contracting, build roads and bridges; capital, $50,000. Incorporators: Robert F. McGaw and David G. Gray, Philadelphia; Bruyn Hasbrouck, New Paltz, N. Y.

MUNICIPAL APPLIANCES

Paving on Bridges

A paving that is much used on bridges is the Shuman W and A Sectional Paving made by R. F. Shuman & Co., 88 Washington street, Chicago. It has also been used in front of some of the public buildings. This paving is made up in sections about three feet square and consists of strips of hard wood about one inch thick and three inches wide, bolted together and giving the edge of the strips for a wearing surface. The wood is thoroughly treated and waterproofed before being made up. It has been found in Chicago that this material will so far outwear ordinary oak planking on bridges that it is very much cheaper.

In submitting specifications for a proposed bridge City Bridge Engineer Thomas G. Pehlfeldt made the following report:

On November 20, 1904, the Kinzie street bridge was paved with the Shuman pavement after a thorough investigation had been made as to its merits. Since that time the pavement has been in constant use with the exception of about two months in 1905, when the bridge was closed to traffic for general repairs; and while some signs of wear are showing, the pavement will be serviceable for two or possibly three years to come. Prior to November 20, 1904, this bridge was paved with 3-inch oak planks, which would wear out and had to be renewed three times a year. The last oak plank pavement on this bridge was laid in July, 1904. After being in service for four months this pavement was completely worn out, and on November 20, 1904, the Shuman pavement was substituted.

The cost of Shuman pavement as laid on this bridge, including material and labor, was $1,011.70, and as the roadway of the bridge contains 302 square yards, the cost per square yard was $3.35. The cost of the 3-inch plank pavement laid on the same bridge in July, 1904, including material and labor, amounted to $600.98, or $1.99 per square yard. The Shuman pavement has been in use nearly three years and is still in good condition, but, granting its life to be only three years on this particular bridge, its cost per year would be $337.23. The cost of the 3-inch oak planking, the life of which is four months on this bridge, would amount to $1,802.94 per year. These figures represent the actual cost of the respective pavements and are not based on assumptions and estimates. It will be seen that by using the Shuman pavement on the Kinzie street bridge the city has effected a saving of nearly $1,500 per year, and at the same time saved the public the delay and inconvenience that would necessarily be occasioned by the renewal of the plank pavement three times a year.

Asphalt Plant

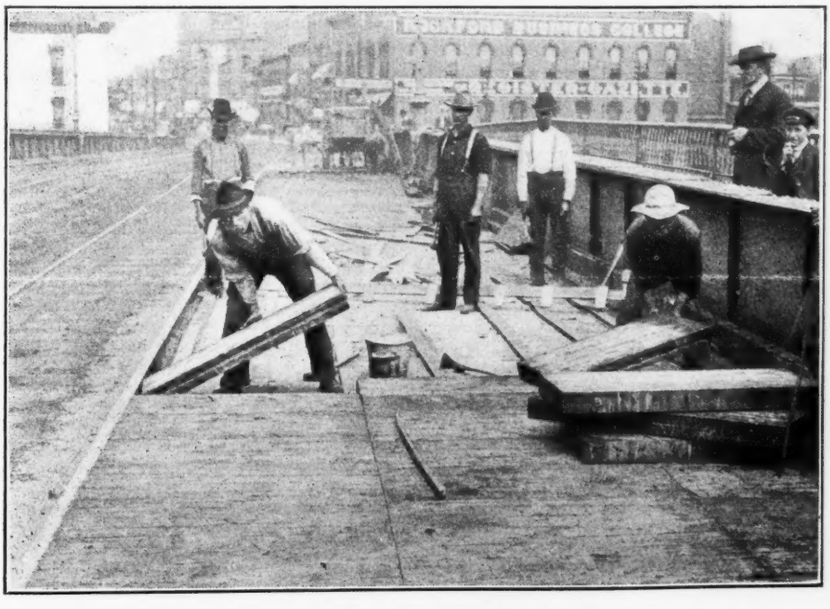
The Guelich Portable Asphalt Plant Company, of Chicago, Ill., has just completed and perfected a new machine embodying the principles of their older machines, but having a much larger capacity and showing greater refinement in the details of construction. The Guelich machines are capable of making new sheet asphalt, either from entirely new materials or by the addition of asphaltic cement to old pavement, as well as asphaltic concrete. The machine is designed either for municipalities desiring to do their own work or for private contractors.

Some of the details of the new machine follow. Its total weight is about 22,000 pounds. For operating the machinery and for moving the machine from place to place, an 18-h.-p. traction engine is furnished. The asphalt machine has a frame made up of 8-inch I-beams carried on strong metal wheels. Attached to the middle of this frame is the furnace with its double doors. The walls of the furnace are of fire brick and the ends are inclined at such an angle that the heat reaches the extreme ends of the cooking drum. The grates are made in small sections which can easily be removed when necessary. Of particular interest is the ash box which gives absolute control of the fire and prevents hot coals or ashes dropping onto the street beneath the machine.

The mixing drum is of their regular type eccentric roller drum, being, however, considerably larger. It is 50 inches internal diameter and 10 feet 6 inches long. Sets of blades placed at 90° with each other serve to thoroughly stir the material. The drum is mounted on four heavy rollers, two at each end and is driven by gearing. The gear on the drum is of cast steel bolted in place, so that if it becomes broken it can easily be replaced. At the front end of the mixing cylinder is a door from which the mixed material is discharged. At the rear end at the center of the mixing drum is introduced a screw conveyor which delivers the hot aggregate. At the same place the liquid asphalt flows in and comes in contact with the aggregate as both enter.

At one side of the machine and extending partially over the mixing drum is the asphalt tank. This holds between 1,100 and 1,200 pounds of asphalt and is heated by hot air passing around it. If necessary, dampers can be opened which permit heat to pass directly around the asphalt tank to increase the rate of heating, or other dampers can be opened admitting cool air to retard the rate. The asphalt is raised to the top of the machine by means of a light detachable derrick fastened to the side. Here the attendant deposits it in the melting tank through doors. The melted asphalt is delivered to the measuring tank by means of a pump. At the opposite side of the machine are two cylindrical revolving driers with a total length of 17 feet for drying and heating the aggregate. A fan at the top of the machine draws the heat up over and around the mixing drum and the lower drier, and passes it through the interior of the upper drier carrying the steam given off to the outlet. The aggregate is dumped into a conveyor at the side of the machine which elevates it to the top, where it is introduced into the top drier. Passing through this it is dropped into the lower drier which empties into a second conveyor which finally deposits it in a measuring bin at the top of the machine. The driers revolve on shafts running on roller bearings. The driving of all parts is by means of friction clutches, thus reducing the danger of breakage of parts to a minimum.

In the operation of the machine, one man standing on the platform on top has control of all apparatus. Thermometers are so arranged that at all times he can learn the temperature at various points. The regular batch is about 3½ cubic yards, which can be introduced into the machine in 4½ minutes. Three batches may be turned out in an hour, which would supply sufficient material to cover about 1,200 square yards in ten hours.



LAYING SHUMAN'S WOOD SECTIONAL PAVING

Bitose Fillers and Road Oils

The Ellis Co., East Brooklyn Station, Baltimore, Md., manufactures bituminous preparations of various consistency for use in connection with block pavements and macadam and earth roads. All the Bitose preparations are manufactured from petroleum, with an asphaltic base by a special process controlled by the company. They have a purity of 99 per cent. As prepared as a filler for stone or brick pavements, Bitose is tough and rubbery from all temperatures, from zero to 150° F., and is liquid at 250° F. The weight of this preparation is 8 pounds to the gallon, as compared with 10½ to 12 pounds for some fillers. Two preparations are made for road treatment: A for sprinkling, and B for mixing and rolling into the surface. The former is applied cold after the road is swept by a laborer with a can or by means of a sprinkling cart. Bitose B is applied hot after the surface of the road is harrowed. After the application has been made the road is rolled with a steam roller.

Dealers in Paving Appliances

The following is a list of manufacturers and dealers in paving appliances:

Acme Road Machinery Company, Frankfort, N. Y., crushing plants, graders, rollers.
Ames Plow Company, Quincy Hall, Boston, Mass., paving tools.
Anderson Forge & Machine Company, 271 Guoin street, Detroit, Mich., paving and cement-working tools.
Atlas Dryer Company, Cleveland, O., asphalt paving plants.
Austin-Western Company, Chicago, Ill., graders, crushers, sprinklers, sweepers, rollers.
F. Bissell Company, Toledo, O., paving tools.
Buffalo Steam Roller Company, Buffalo, N. Y., macadam and asphalt rollers, scarifiers.
J. I. Case Threshing Machine Company, Racine, Wis., road graders, traction engines.
Climax Road Machine Company, Marathon, N. Y., crushing plants, graders, horse rollers.
Contractors' Tool Company, 704 Arch street, Philadelphia, Pa., asphalt and cement tools.
Crescent Novelty Manufacturing Company, 703 South Broadway, St. Louis, Mo., paving tools.
F. D. Cummer & Son, Cleveland, O., asphalt plants and machinery.
D. Connelly Boiler Company, West avenue, Cleveland, O., street-flushing machines.
Cyrus Currier & Sons, 17 Railroad place, Newark, N. J., asphalt repair kettles.
Drake Standard Machine Company, 300 Jackson boulevard, Chicago, Ill., concrete mixer for pavement foundations.
East Iron & Machine Company, Lima, O., one-car asphalt plants.
Enterprise Manufacturing Company, Columbiana, O., horse rollers.
Erie Machine Shops, 1303 Peach street, Erie, Pa., steam rollers and asphalt mixers.
E. D. Etnyre & Co., Oregon, Ill., street sprinkling wagons.
F. H. Evans Company, 596 Kent avenue, Brooklyn, N. Y., tar kettles.
William J. Hauck, 306 Southwest boulevard, Kansas City, Mo., concrete tools.
Hetherington & Berner, Indianapolis, Ind., asphalt plants and machinery.
A. E. Hibbs, 209 Quarry street, Philadelphia, Pa., tar kettles.
Robert Hooke, Chattanooga, Tenn., asphalt repair kettles.
Indiana Road Machine Company, Fort Wayne, Ind., grading and loading machines, crushing plants, traction engines.
Iroquois Iron Works, Buffalo, N. Y., asphalt plants, tools and machinery.
Kelley-Springfield R. Roller Co., Springfield, Ohio, steam rollers, scarifiers.
Kindling Machinery Co., Milwaukee, Wis., squeegees, street cleaning machine.
Koehring Machine Co., 501 Germania Building, Milwaukee, Wis., concrete mixers for pavement foundations.
L. O. Koven & Bro., 50 Cliff street, New York, tar kettles.
Littleford Bros., 453 E. Pearl street, Cincinnati, Ohio, tar kettles.
W. C. Lyman, 49 Michigan street, Chicago, Ill., tar kettles.
Monarch Road Roller Co., Groton, N. Y., road rollers.
Orr & Lochett Hardware Co., 71 Randolph street, Chicago, Ill., paving tools.
Pioneer Iron Works, 149 Pioneer street, Brookline, Mass., steam rollers tar kettles.
Pioneer Machine Works, 75 Delavan street, Brooklyn, N. Y., steam rollers.
Alex. Pollock Co., 203 West street, New York, tar kettles.
Jos. G. Pollard, 141 Raymond street, Brooklyn, N. Y., stone pavers' tools.
Reeves Bros. Co., Alliance, O., tar kettles.
Riter-Conley Mfg. Co., Pittsburg, Pa., tar kettles.
Ruggles Coles Engineering Co., 39 Cortlandt street, New York, sand dryers.
Sanitary Street Flushing Machine Co., Carleton Building, St. Louis, Mo., street flushing machines.
G. L. Steubner Iron Works, Vernon avenue, Long Island City, N. Y., tar kettles.
Stafford wright, Lawrence, Mass., tar kettles.
Studebaker Bros., Manufacturing Co., South Bend, Ind., steam sprinklers.
Wm. Swindel & Bros., German National Bank Building, Pittsburg, Pa., tar kettles.
John Thurls Sons, 26 Cortland street, New York, tar kettles.
Toy's Automatic street scraper, 108 E. North street, Sidney, Ohio, street scrapers.
Trow & Holden, Barre, Vt., paving tools.
Union Iron Works, Hoboken, N. J., tar kettles.
Vulcan Iron Works, Fulton and Quincy avenues, Chicago, Ill.
Warren Bros. Co., 93 Federal street, Boston, Mass., asphalt plants and machinery.

TRADE NOTES

Cast-iron Pipe.—Chicago: Business consists of small routine orders. Quotations: 4-inch, $28; 6 to 12-inch, $27; 16-inch and up, $25. Birmingham: Prices of recent contracts are considerad as satisfactory in view of the uncertainties in other lines. Quotations: 4 to 6-inch, $26; 8 to 12-inch, $25; over 12-inch, average $24.

Lead.—The lead market is weaker and prices are down all around. Reports of an open market in lead are current. The Metal Exchange figures were easier at 3.95@4c., and the American Smelting and Refining Company's prices were reduced 10 points to 4c. St. Louis market was unchanged at 3.80@3.85c. In London soft Spanish was quoted at £13 10s and soft English at £13 7s 6d.

Wire Cut Paving Brick.—An improvement in the process of manufacturing paving brick by means of which a better and cheaper brick can be turned out than formerly is claimed by its inventor, Frank B. Dunn, of Conneaut, O. The invention consists of guides, either rigid or in the form of rolls, attached to the platen of the cutting table of a brick machine above and below the column of clay, and projecting over the line of travel of each wire as it passes through the clay column, thus deflecting the wire slightly and forming a rib or lug across the face, or rather, the side of a side-cut brick. This also makes a corresponding groove in the adjoining brick, but the groove can be easily removed by attaching extra wires to cut off sufficient clay, which will immediately return to the auger machine over the waste clay conveyor. The groove, however, is not considered injurious to the brick, and may be left on, thus avoiding any waste of clay. The lugs and grooves can be so accurately cut that an interlocking pavement may be made requiring little or no filler. The new brick will have square edges.

Improving Asphalt Plant.—The Toledo Asphalt Company at Ironville, O., is making extensive improvements this winter, $28,000 worth of new machinery having been secured and the work of installation is now in progress. Charles A. Luck, of the asphalt plant has informed the East Side Improvement Association that the plant will be in full operation by April 1, when it will employ a full force of men. The company has expended $100,000 in improvements since taking over the Ironville plant, and Mr. Luck said that an entirely new process of manufacture, with new machinery and straight business methods, would insure the best pavements.

Waterproofing, Mastic and Cement Work.—The Barber Asphalt Paving Co. announce the organization of their mastic, cement and waterproofing department in New York City, with offices in the Hudson Terminal Building, 30 Church street. The new department will lay rock asphale mastic floors and pavements and do waterproofing in all its branches by the positive seal method, as well as cement work of all descriptions, cork insulation, reinforced concrete, brewery, malthouse and reservoir work. Vulcanite mastic manufactured from genuine Sicilian rock asphalt is exclusively used. This department is under the management and has the services of a corps of efficient graduate engineers, with J. Lee Allen as manager.

Cement Trust.—Investigation of the recently formed $200,000,000 Cement Trust has led to the declaration by competent lawyers that it can successfully resist the Sherman Anti-Trust Act, bid defiance to the United States Supreme Court and carry on operations despite all existing State and Federal statutes. Seventeen great companies make up the trust, and they produce more than 40,000,000 barrels of Portland cement annually. The total production of Portland cement in the United States in 1907 was 48,785,390, showing that the new cement "octupus" has left one-fifth of the output in independent hands. The motive of the trust lies—ostensibly—in the protection of the "patent rights" for a certain formula under which nearly all cement known as "Portland" is made, following out the plan by which the American Association of Licensed Automobile Manufacturers have successfully resisted attack on certain patents on road engines and accessories. The trust's attorneys say that it is legal to issue licenses to operate under their patents, in which there is a pledge that cement manufactured by the licensee shall not be sold at a price below that fixed by the licensor. Already the trust has advanced the price to $1.30 a barrel, which is thirty-five cents more a barrel than the United States Government recently paid for a large order for use in a great public undertaking.

Taroid.—The F. J. Lewis Manufacturing Company, 1170-1200 South Robey street, Chicago, Ill., distillers of taroid, paving pitch, paving tar, creosote and coal tar products, is distributing a folder, telling about the use of "taroid" on macadam roads. This suppresses the dust, forms a binding material to hold the stone together and increases the life of the road. The company is now preparing an illustrated "Good Roads Catalogue," which they will soon be ready to send out. Copies of the specifications for the use of taroid can be obtained on application.

Pump Company Changes.—As a result of the resignation of John W. Dunn, of East Orange, N. J., as president of the International Steam Pump Company, whose largest plant is at Harrison, N. J., there will be something of an upheaval in the steam pump and air compressor industries which will have considerable effect on the industrial world. Benjamin Guggenheim has been elected president of the international company, and plans are now under way in that organization for issuing $5,000,000 worth of long-time bonds to meet competition which is expected from a company Mr. Dunn is forming to enter the steam pump and air compressor fields. The International Steam Pump Company announced recently that $500,000 will be spent shortly in equipping a new plant for the manufacture of an entirely new line of machinery. Just what branch of the machinery industry the company intends to invade has not been stated. An official of the company stated that the company will keep secret the line of machinery it intends to manufacture until the plant is erected. Whether this announcement is a counter move in the fight which the Dunn interests have started is not known. The International Steam Pump Company once manufactured air compressors, and it may be that they will enter that field again in retaliation of the invasion of the pump industry by the new company, in case the last-mentioned move is made.

Municipal Vehicles.—George H. Holzbog & Bro., Jeffersonville, Ind., successors to the United States Sanitary Company, of Washington, D. C., give some of the points of merit of their product in a thirty-page booklet which can be secured on application. This company makes a specialty of manufacturing vehicles for municipalities, including sanitary collection wagons for garbage, etc., large capacity light wagons for street sweepings, dust, etc., and ambulances for hospitals and Police Departments. Their garbage collection wagons are used exclusively by the United States War Department around army posts and are also much used by the United States Navy Department in yards. These wagons are built in four sizes. Two sizes of two-wheeled carts drawn by a single horse, holding respectively 37 and 54 cubic feet and two sizes of four-wheeled, two-horse wagons holding 65 to 80 cubic feet. These wagons are all made with tight metal bodies and close fitting covers. The axle passes through the body and is encased in a boiler tube riveted to the sides and making a tight joint. By passing the axle through the body the height is also reduced so that the top is only four feet four inches from the ground, making it easy to load. Covers both front and rear make the body easy to load and easy to clean. The rear cover can be opened and held in any desired position. The dumping mechanism is easy of operation and holds the body in any position best adapted for dumping. These wagons are particularly suited for collection of garbage and night soil. This company also manufactures an end dumping metal body wagon, and a large light dumping wagon especially designed for street sweepings, paper, etc.

Power Development.—The Grand Falls Power Company, Grand Falls, N. B., will build a plant on the St. Johns River at Grand Falls, which will generate 100,000 horsepower in electric current, which will be distributed to the various cities throughout New Brunswick and Maine. The work involves, among other features, the construction of a number of shafts in rock excavation 130 feet deep, a power chamber 30 x260 feet and 130 feet deep, and a tail race tunnel 28 feet in diameter and 2,400 feet long, a power house 350 feet long and 260 feet wide. The intake shafts will be nine in number and 12 feet in diameter and 130 feet deep. The plant will be equipped with the most approved hydraulic and electrical machinery for high potential and long distance transmission. Actual construction will be begun immediately and will be pushed through to completion at an early date. The Falls and water power on the St. Johns River at this point is the largest in Eastern Canada, and its development will result in the establishment of a large number of manufacturing enterprises. The total head developed will be 135 feet. Numerous auxiliary works, substations and long distance transmission lines will be erected. The St. Johns River at Grand Falls (which is the largest river in New Brunswick) describes a horseshoe curve at this point, and has a fall of 135 feet through a gorge of the most magnificent scenic beauty. This spectacle is second only to that of Niagara, and its utilization, like that of Niagara, will result in a great increase in industrial activity in the province. Grand Falls is situated on the Canadian Pacific Railroad, about 200 miles north of St. Johns, N. B., and about two miles east of the State of Maine. The expenditure involved will amount to over $5,000,000.

New Power Company.—After months of preparation a company has been formed at Vineland, N. J., with a capital of $100,000 to develop the water power of Maurice River, a movement which should place Vineland foremost as a manufacturing center because of cheap power. The name used is the Maurice River Light, Heat and Power Company. The promoters are E. C. Potter, of this place; E. W. Maloney, of Avondale, Pa., and others. The money was put up, and as soon as the necessary legal papers can be executed work will begin. Mr. Maloney is to be President, Potter, Vice-President; Fry, Secretary. Over 1,200 acres of land have been purchased of Thomas Fox, G. W. Leach, the Charles K. Landis estate, A. Brotman, and others, on which will be a lake of ten acres, affording boating, fishing and skating for Vineland. A dam half a mile long is to be constructed immediately north of Landis avenue, which will furnish 16 feet of waterfall. The company expects to furnish electricity at less cost than steam can be made.

New Automatic Gas Lighting.—Several arrangements have been devised having for their object the automatic ignition of the gas on turning on the tap, the usual method being such that when the plug is turned from the closed to the open position contact is made and a current passes temporarily through a wire which, being raised in temperature, ignites the issuing gas. A patent has been granted to a German Engineer for an improved arrangement of this type, the plug of the tap being bored in an inclined direction, so that to turn it from the closed to the fully open position it is necessary to turn through two right angles instead of through one, as is usually the case. This takes, of course, a somewhat longer time, sufficient, in fact, for a wire to be raised to the igniting temperature. Almost directly after one begins to turn the tap contact is made, the ignition device brought into circuit, contact being again broken shortly before the complete turn through 180 degrees is finished. The advantage offered by this new form of tap is that, since it takes longer to turn the plug through two right angles than through one, the circuit remains closed for a longer period than with most arrangements of this character, and, in consequence, the ignition device works with greater reliability. By suitable arrangement of the gas pipes and taps the gas lamps may be arranged in groups, and thus be lit up from any desired position, as one may in the case of an electrical equipment.

Luminous Arc Lighting.—The General Electric Company, Schenectady, N. Y., in Bulletin No. 4,620, describes its series luminous arc rectifier system, which forms a striking contrast to the old open arc system of lighting. The bulletin goes more or less into details and describes the various pieces of apparatus used in connection with the system, including arc lamp hangers and cut-outs, constant current transformers, mercury arc rectifier tube, switches for use in connection with the system, etc. It contains, also, dimensions and connection diagrams.

Filter Presses.—The International Continuous Filter Press Co., 10 Weybosset street, Providence, R. I., having taken over all the patent rights and good will of the American Extractor Corporation, are now prepared to supply the Wheelwright Patented Continuous Extractors and Filter Presses for use in the packing house trade and other industries for treatment of sewage sludge, and also complete apparatus for the Wheelwright Hot Water Process of Garbage Reduction.

PERSONALS

ALLIN, T. D., former City Engineer of Pasadena, Cal., and one of the founders of the city, has been appointed to the newly created Sewer Farm Board; also Prof. Ralph E. Smith, the head of the Whittier Agricultural Station, who suggested the Board as a condition to the establishment of an experimental station at the farm, while Mayor Thomas Earley, who retires from office May 1, is to be the third member of the Board.

BAKER, WALTER, City Clerk of Laporte, Ind., died February 18.

BALDWIN, GEORGE, Cape May, N. J., has been elected Chief of Police by Council to fill a vacancy caused by the resignation a year ago of William Farrow, who had filled the office for many years. While the election was for a year, it is the opinion of lawyers that under the tenure of office act this inducts him into office permanently during good behavior.

BALL, MAJOR NEWELL, Assistant Superintendent of Street Cleaning of Washington, D. C., has resigned owing to a reorganization of the department, and Robert E. Doyle, Chief Inspector, has been promoted to the position at a salary of $1,200 per annum, while C. S. Shaw, Inspector, at $1,100, has been promoted to Chief Inspector at $1,200.

BISHOP, H. K., of Albany, has been appointed First Deputy Commissioner of the New York State Highway Commission, and Frank D. Lyon, of Binghamton, Second Deputy.

BOEHNE, JOHN W., Mayor of Evansville, Ind., resigned March 1, in order to be sworn in as a member of Congress from the First Indiana District. He was succeeded by John J. Nolan, City Comptroller.

BRADEN, WILLIAM, Portland, Ore., for 33 years an employee of the city, holding various responsible positions in the City Engineer's office, died recently, and members of the City Council attended the funeral in a body.

BURK, D., Chief of the Fire Department of East Grand Forks, N. D., for the past year, has resigned to accept a more lucrative position. He was brought from St. Paul, Minn., on account of the demand for a trained fire-fighter, following a number of disastrous conflagrations in East Grand Forks.

CLAPP, OTIS F., City Engineer of Providence, R. I., has been appointed for another term by Walter F. Slade, Commissioner of Public Works, the Commissioner holding that the charges made by former Mayor P. J. McCarthy, while in office, against the City Engineer, had no foundation in fact and were too trivial and vague to call for serious consideration.

CLAY, GEORGE STRONY, Plainfield, N. J., has been elected Councilman to fill the unexpired term of Robert E. Hall, resigned.

DEARBORN, THOMAS H., Dover, N. H., has been appointed to the Dover Police Commission by the Governor of the State; Samuel Welch to the Somersworth Police Commission, True L. Norris to the Portsmouth Police Commission.

DUTTON, C. W., Bisbee, Ariz., has been appointed City Electrician, and the Building Committee of Council has been instructed to secure data and draw up an ordinance covering the powers and duties of the new official.

FORD, OWEN, an expert water engineer, has been engaged by the city of Knoxville, Tenn., to appraise the plant of the Knoxville Water Company, with a view to its acquisition by the city.

GOLDSTEIN, MISS H. BESSIE, Boston, Mass., has been appointed an inspector in the Sanitary Division by Guy C. Emerson, Superintendent of Streets. She came

to this country with her parents when eight years old, received a public school education and has done much social work, and will be sent to the North End to conduct a campaign of education among the foreign-born population. She is the first woman to receive such employment.

HASSETT, TIMOTHY, Captain of the night watch of Olean, N. Y., was shot and killed by a burglar whom he surprised at work, and the latter was himself mortally wounded by the police official.

HAUSSLING, JACOB H., Mayor of Newark, N. J., was tendered a dinner recently on the occasion of his fifty-fourth birthday and was presented with a watch engraved with his monogram and suitable inscription by former Mayor William H. F. Fiedler on behalf of his many friends.

HILL, L. H., of Lawtey, Fla., has been elected Mayor without opposition, succeeding J. B. McCulley, who has filled the office since the town was incorporated five years ago.

JOHNSON, THOMAS TAYLOR, Chicago, Ill., designer of the motor works of Savannah, Ga.. and Memphis, Tenn., died February 23.

KELLER, EDWARD J., of the City Engineer's staff of Trinidad, Col., died recently, he had served in the engineering corps of the New York Central & Hudson River Railroad, and also on the Atchison, Topeka & Santa Fe Railway.

LEWIS, IKE, Mayor of Martins Ferry, O., has declined to accede to the request of the Civic League of the city that he resign, and City Solicitor George Cooke will now prefer charges against him with Governor Harmon.

MARTIN, F. P., Mayor of Washington, La., was defeated for re-election by G. H. Hanley, while Oscar Meelaneen, L. A. W. Quirk, F. T. Boudreau, Thomas McCaffery and J. Win Elter were elected Aldermen.

O'BRIEN, CHARLES A., an attorney of Pittsburg, Pa., has been chosen by Mayor-elect Magee for the position of City Solicitor.

PENICK, J. T., Mayor of Elkton, Ky., has resigned to accept a position under Sheriff Shelton, and E. B. Weathers, member of Council and a well-known druggist, has been elected to fill the unexpired term.

PERRIN, GEORGE E., Batavia, N. Y., has been elected Supervisor, succeeding John Thomas, resigned.

RICHARD, C. B., of Lake Charles, La., has been nominated for Mayor over Ben M. Foster, the selection being equivalent to an election; T. E. Ott, E. W. Chaunelle, John H. Poe, J. N. Yeager, Albert M. Jones and A. S. Dudley have been named as Aldermen

SAILE, JOSEPH C., Health Inspector of Bloomfield, N. J., for over two years, has been elected by the Health Board as Secretary and Register of Vital Statistics to succeed William L. Johnson, resigned.

SHEPHERD, A. B., Superintendent of the Water Bureau of Pittsburg, Pa., who has been Acting Director of the Department of Public Works, has finally been relieved of the duties of the directorship after a number of appeals to Mayor George W. Guthrie, in order that he may devote his entire attention to the Water Bureau.

SMITH, W. E., City Engineer of Webb City, Mo., has resigned to become general manager of the Engineering Construction Company, of Kansas City. Mr. Smith will begin work for the construction company at Purcell, Okla., in charge of sewer construction.

SPANGLER, W. A., Mayor of Bonham, Tex., was defeated for re-election by L. K. Hargrove, T. A. Barron and A. J. Stevenson also being aspirants. Aldermen elected were: R. L. Nunnelee, Virge Deering, T. E. Kennedy, H. C. McAnally and P. O. Robinson.

STRAUB, THAD, Mayor of Hamilton, O., has been appointed, through Grand Exalted Ruler Dawson, of the B. P. O. E., as State District Deputy of the order for the district embracing the city of Hamilton and county.

TIGHE, JAMES L., M. Am. Soc. C. E., City Engineer of Holyoke, Mass., has been elected a member of the Institution of Civil Engineers of Great Britain.

VAN VOAST, HORACE S., Mayor of Schenectady, N. Y., has started on a trip to Panama and intends to stop at about fifty cities to study sewage and garbage disposal and other municipal subjects.

VIRGIN, DR. WALTER S., of Washington, D. C., has been appointed a Sanitary and Food Inspector of the District of Columbia on recommendation of Dr. W. C. Woodward, Health Officer, to succeed Ernest N. Bales, resigned, at a salary of $900 per annum. Dr. Virgin was first on the list of thirty-five eligibles.

WITBECK, HOWARD M., former Mayor of Lockport, N. Y., and Alderman James Moran have been appointed members of the Charter Revision Commission of the city by Mayor Minard to succeed W. A. Williams and D. C. Carroll, resigned.

WILSON, GEN. JOHN M., Chairman of the Electric Railway Commission of the District of Columbia, has been declared ineligible by the Comptroller of the Treasury, who held that, since Gen. Wilson could not, under the law, serve without remuneration, he could not serve at all, inasmuch as he was drawing pay as a retired officer of the U. S. Army; Henry L. West, member of the Board of Commissioners of the District of Columbia, has been appointed by the Interstate Commerce Commission to succeed Gen. Wilson, and the Comptroller holds that there can be no objection to this, as the District Commissioner is classed as a municipal officer.

BRUCE, CHARLES, Everett, Mass., has made the following reappointments:

City Engineer, William E. Hill.
Nathan Nichols, City Treasurer.
Charles R. Ford, City Auditor.
Nelson P. Brown, City Solicitor.
Christopher Harrison, Chief of Police and Keeper of Lockup.
Elisha A. Loring, Building Inspector.
George H. Wood, Assessor for three years and Samuel P. Cannell, Overseer of Poor and City Almoner for three years.

Other appointments were: To the Board of Health, Dr. William S. Schley, vice Dr. A. H. St. C. Chase, term expired; William G. Webster, member of Fire Board for three years, vice Austin White, term expired; J. Arthur Benner, member of Board of Public Works, vice William G. Webster; Willard R. Wilson, Sinking Fund Commissioner for three years; ex-Alderman George W. Buntin, Jr., member of Board of Trustee of Parlin Library, to fill vacancy caused by resignation of Senator Wilmot R. Evans, Jr.; Harriett W. Vaughn, William E. Battles, Frederick E. Jennings and Morrison A. Herman, Trustees, Parlin Library for three years.

ENGINEERING EXAMINATIONS

Water Works Supervisor.—The Board of Examiners, Minneapolis, Minn., will hold an examination at the office of the City Engineer, March 15, to examine candidates for the position of Supervisor of the Water Works. Address

ANDREW RINKER, City Engineer.

Civil Engineer, Philippine Service.—The United States Civil Service Commission announces an examination on March 10-11 to secure eligibles to fill vacancies in the position of civil engineer in the Philippine Service. The entrance salary is usually $1,400 per annum. There are, however, similar positions in that service paying higher salaries, and it is desired to secure from this examination eligibles who are qualified to fill the higher-salaried positions in the event that vacancies therein occur. It is especially desired to secure eligibles who have had experience in river or harbor work to fill two positions, one at $1,800 and the other at $2,000 per annum.

PROPOSALS

STREET IMPROVEMENTS

Beaver Dam, Wis.

Sealed proposals will be received by the Board of Public Works until March 12, 1909, at 7:30 o'clock P. M., for grading, draining, curbing and paving with vitrified block portions of Front, Center and South Spring streets of the City of Beaver Dam, Dodge County, Wis. Specifications may be had by applying to the City Clerk, and plans and specifications can be seen at his office. Work comprises about 15,000 square yards of brick paving. Address bids to the undersigned as secretary of the Board.

ANTON A. FISCHER, City Clerk.

REINFORCED CONCRETE BRIDGE

Geneva, Ill.

Sealed proposals will be received at the office of the City Clerk until 7:30 P. M., March 15, for the construction of a reinforced concrete highway bridge over Fox River at State street.

All work to be done and materials supplied according to plans and specifications on file in the office of the City Clerk.

The work will be paid for in cash as the work progresses, in accordance with the specifications.

All bidders will be required to enclose a certified check in the sum of fifteen hundred ($1,500) dollars as a guarantee of good faith.

Gravel and filling will be supplied by the City of Geneva at the same price to all bidders. Inquire of the City Clerk.

The City Council reserves the right to reject any or all bids.

OSCAR NELSON, City Clerk.

ELECTRIC LIGHTING

Sumter, S. C.

Bids will be received until 12 o'clock, noon, Tuesday, March 23d, 1909, for furnishing the City of Sumter with fifty enclosed incandescent arc lights, 2,000 nominal candle power. All within a radius of one mile from center. All night and every night service. Also prices on additional lights as needed, above fifty and not exceeding eighty. Contract to run ten years from Nov. 1st, 1909.

Address C. M. HURST,
Clerk and Treasurer.

FILTER PLANT

White Plains, N. Y.

Sealed proposals will be received until 12 o'clock noon Monday, March 8, 1909, by the Board of Water Commissioners of Village of White Plains, N. Y., at their office, Eastern State Journal Building, 133 Railroad avenue, White Plains, N. Y., to furnish and install a mechanical pressure filtration plant under specifications approved by the Board of Water Commissioners at a meeting held at their office February 17, 1909.

All bidders are requested to visit the grounds and ascertain for themselves the work to be done.

Specifications will be forwarded upon application for the same to the office of the Commissioners.

The Board of Water Commissioners reserves the right to reject any or all bids.

JOHN N. HEENEY,
Superintendent.

PUMPS AND BOILER

Muskogee, Okla.

Bids will be received until 5 o'clock P. M., March 15, 1909, at the office of the City Clerk, Muskogee, Okla., on a four million gallon high service pump, a five million gallon low service pump and a two hundred and fifty horsepower tubular boiler.

Certified check for two thousand dollars must accompany each proposal.

L. B. KINSEY,
City Engineer.